IMPERIAL MYCOLOGICAL INSTITUTE
25 FEB 1935

# THE GARDENS' BULLETIN

## STRAITS SETTLEMENTS

Vol. VIII 26th January, 1935 Part 2

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**To be purchased at the Botanic Gardens, Singapore**

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SINGAPORE:
PRINTED AT THE GOVERNMENT PRINTING OFFICE, SINGAPORE,
BY W. T. CHERRY, GOVERNMENT PRINTER.

1934

THE

# GARDENS' BULLETIN

STRAITS SETTLEMENTS

Vol. VIII 26th January, 1935 Part 2

## SOME MALAYAN ORCHIDS V.

*By C. E. Carr, F.L.S.*

In the present paper are enumerated the orchids collected by the Oxford University expedition to Sarawak in 1932. The expedition visited the mountains of the Fourth Division and most of the plants were collected on and around Mount Dulit at altitudes ranging from near sea level to 1,400 metres with one number at 1,900 metres. Over half the plants were found below 900 metres altitude. Collecting was carried on from the end of July until November.

The collection comprises 132 species of which 32 are found to be as yet undescribed. It has been necessary to make 4 new varieties and 1 new name. There are 6 new combinations, namely Chelonistele kutaiensis *Carr* (*Coelogyne kutaiensis* J. J. S.), Dilochia gracilis *Carr* (*Arundina gracilis* A. & S.) Trichotosia aurea *Carr* (*Eria aurea* Ridl.), T. lacinulata *Carr* (*Eria lacinulata* J. J. S.), Sarcopodium speculum *Carr* (*Dendrobium speculum* J. J. S.), and Sarcochilus indusiatus *Carr* (*Thrixspermum indusiatum* Rchb. f.).

Apart from the new species there are 18 previously known species now reported from Borneo for the first time (marked with an asterisk). Of these the most interesting are *Stereosandra javanica* Bl., *Aphyllorchis striata* Ridl., *Tainia vegetissima* Ridl., *Liparis purpureo-viridis* Burk. & Holtt., *Dendrobium ustulatum* Carr and *Bulbophyllum foetidolens* Carr.

**Peristylus Hallieri** J. J. S. in Bull. Dep. Agr. Ind. neerl. xxii (1909), 1; Bull. Jard. Bot. Buit. II. Suppl. t. 2, f. II.

S. 543, Ulu Koyan c. 800 m., September 22nd, 1932, *P. W. Richards.* "Growing among moss and *Dipteris* on rocks by river and probably covered when river rises. Flowers green. No scent.

*Distribution:*—Endemic.

**Corybas Johannis Winkleri** J. J. S. in Bull. Inst. Bot. Hamb. vii (1927), 14, t. 1, f. 4.

S. 449, Dulit ridge c. 1200 m., September 10th, 1932, *P. W. Richards.* "Growing on rocks with small herbs and moss under waterfall in moss forest. Flower dark crimson-red with cream edge and prolonged petals, white in centre of flower. Leaf pale green with prominent veins. Root tuberous."

2713, Gunong Santubong c. 400–700 m., December 1932, *P. W. Richards.* "Among moss on siliceous rocks in forest growing in groups of 4–5 plants. Flowers white marked with crimson."

*Distribution:*—Sumatra.

**Cryptostylis acutata** J. J. S. in Bull. Jard. Bot. Buit. Ser. 3, III (1921), 243; l.c. v (1922), t. 24, f. III.

S. 441, Dulit ridge at c. 1240 m., September 7th, 1932, *P. M. Synge.* "On bank in moss forest. Posterior petal prominent, crimson with deep crimson spots. Labellum crimson. Column green. Two lateral petals erect. Leaves medium green with brown markings."

*Distribution:*—Java, Sumatra, British North Borneo.

***Stereosandra javanica** Bl. Mus. Bot. Lugd. Bat. II, 176; Fl. Jav. Orch. 27, t. 10, f. 3, t. 11 G.

2315, Dulit under 300 m., October 23rd, 1932, *native collector.* "Saprophyte, flowers violet and white."

*Distribution:*—Sumatra, Java, Malay Peninsula, Philippines, ? N. Guinea.

**Lecanorchis multiflora** J. J. S. in Bull. Jard. Bot. Buit. Ser. 2, xxvi (1918), 8; l.c. ser. 3. v (1922), t. 25, f. II.

S. 1, Marudi near sea level, July 25th, 1932, *P. M. Synge.* "White sandy forest. Growing on ground as saprophyte in shade. White fringed labellum with mauve on the underside."

2241, Dulit under 300 m., October 17th, 1932, *P. W. Richards.* "On summit of ridge, primary forest, saprophytic. Labellum white, other inner perianth segments buff, outer perianth segments light brown to buff."

*Distribution:*—Java.

**Aphyllorchis pallida** Bl. Bijdr. (1825), Tab. f. 77.

S. 282, Dulit under 300 m., August 20th, 1932, *native collector,* saprophytic in primary forest.

*Distribution:*—Java, Sumatra, Malay Peninsula, Philippines.

***Aphyllorchis striata** Ridl. Mat. i, 205.

S. 340, Dulit c. 1,500 feet altitude, August 27th, 1932, *native collector*. "Growing saprophytically in primary forest. Stem fleshy, green with red flecks. Flowers not open. Sheath green with red flecks. Height 3 feet."

S. 546, Dulit ridge under 300 m., September 26th, 1932, *P. W. Richards*. "Probably saprophytic. Stem has mauve markings, fleshy. Flowers cream, mauve stripes on 2 lateral petals. Column mauve. The flower sheath has mauve markings. Slight sweet smell."

*Distribution:*—Malay Peninsula.

***Vrydagzynea tristriata** Ridl. in Journ. Linn. Soc. Bot. xxxii (1896), 398.

S. 357, Dulit under 300 m., August 30th, 1932, *native collector*. "Rock near stream in secondary forest. Leaves velvet black with 3 prominent pink veins. Flowers tubular opening very slightly at the tip, pink at the base, cream above. No scent."

*Distribution:*—Malay Peninsula.

***Vrydagzynea albida** Bl. Fl. Jav. n. ser. I Orch. (1858), 61, t. 20, f. 3.

S. 364, Dulit under 300 m., August 30th, 1932, *P. W. Richards*. "Stream bank in primary forest. Flowers green, not quite open."

*Distribution:*—Sumatra, Java, Malay Peninsula, Philippines.

**Zeuxine purpurascens** Bl. Fl. Jav. n. ser. I. Orch. (1858), 58, t. 18, f. 3; t. 23, F. E.

S. 301, Dulit under 300 m., August 22nd, 1932, *P. M. Synge*. "Terrestrial near a small stream in rocky primary forest. Leaves small with prominent pink vein down the centre and very dark green lamina. Stem pale. Flowers small pale brown with green ribbed and twisted ovary."

*Distribution:*—Sumatra, Java.

**Zeuxine** (§ Hetaeriopsis) **linguella** sp. nov. Caulis e basi repente erectus, c. 9-folius. Folia leviter obliqua, oblongo-ovata, breviter acuminata, acuta, petiolo gracili canaliculato. Inflorescentia laxe multiflora. Bracteæ oblongo-ovatæ, longe acuminate, acutæ. Sepala extus glanduloso-pilosa. Sepalum dorsale ellipticum, obtusum. Sepala lateralia late lanceolata, obtusa. Petala e basi angustissima valde cuneata, obtusa, falcata. Labellum basi saccatum, 3-lobum, sacco intus basin versus appendicibus trilobis 2 donato dimidio superiore carinato, lobis lateralibus erectis late rotundatis, lobo intermedio porrecto lineari-oblongo obtuso. Gynostemium intus bicarinatum, rostello longe bilobo.

*Stems* prostrate and rooting at the base, erect and leafy above, the leafy part c. 11 cm. long, internodes up to c. 1.80 cm. long. *Leaves* c. 9, rather oblique, oblong-ovate, shortly acuminate, acute with a minute mucro, up to c. 5.50 cm. long, c. 2 cm. wide, petiole grooved up to c. 1.70 cm. long. *Inflorescence* elongate, hairy, peduncle provided with 2–3 tubular sheaths and 1 bracteiform sheath above c. 12 cm. long, rachis laxly many-flowered c. 7 cm. long. *Bracts* appressed to the ovary, oblong-ovate, long acuminate, acute, sparsely hairy outside with ciliate margins, c. .50 cm. long. *Sepals* glandular-hairy outside. *Dorsal sepal* elliptic, obtuse, 3-nerved, c. .55 cm. long, c. .27 cm. wide. *Lateral sepals* broadly lanceolate, obtuse, 3-nerved, c. .46 cm. long, c. .22 cm. wide. *Petals* broadly cuneate above the very narrow base, falcate, obtuse, anterior margin roundly dilate above the middle, 1-3-nerved, glabrous, c. .53 cm. long, c. .18 cm. wide. *Lip* porrect, saccate, 3-lobed, the sac provided inside near the base with 2 3-lobed appendages keeled in the upper half with the keel reaching to the base of the midlobe, glabrous, 5-nerved, spread out c. .43 cm. long, c. .25 cm. wide across the side lobes; side lobes erect, broadly rounded, forming with the shallow sac a subquadrate hypochile; midlobe porrect, linear-oblong, obtuse, 3-nerved c. .18 cm. long. Column, including the rostellum, c. .35 cm. tall with 2 strong keels inside below the stigmata, rostellum elongate bifid with the lobes subulate c. .12 cm. long, stigmata oblong. Anther narrowly cordate, long acuminate, acute, keeled above the triangularly obtusely bilobed base.

A distinct species well characterized by the long linear-oblong midlobe of the lip.

S. 302, Dulit under 300 m., August 22nd, 1932, *P. M. Synge.* "Terrestrial on banks of rocky stream in primary forest. Leaves deep green with wide light lamina. Flowers with pink labellum. Ovary brown. Hood green. Lateral petals white."

Described from dried plants.

**Cystorchis aphylla** Ridl. in Journ. Linn. Soc. Bot. xxxii (1896), 400.

S. 600, Niah under 300 m., November 1932, *P. M. Synge.*

*Distribution:*—Sumatra, Java, Malay Peninsula, Philippines.

***Tainia vegetissima** Ridl. in Journ. Linn. Soc. Bot. xxxviii 328.

Dulit ridge c. 1230 m., September 7th, 1932, *P. M. Synge.*

*Distribution:*—Malay Peninsula.

**Cœlogyne** (§ Longifoliæ) **dulitensis** sp. nov. Pseudobulbi elongato-ovoidei, graciles, bifolii. Folia oblongo-oblanceolata, acuta, breviter petiolata. Inflorescentia in pseudobulbo maturo, flores intervallis singulatim gignens. Bracteæ caducæ. Sepalum dorsale oblongum, triangulariter acuminatum, acutum. Sepala lateralia anguste oblongo-ovata, acuta. Petala anguste linearia, acuta. Labellum 3-lobum, lamina tricarinata, lobis lateralibus late et rotundatim triangularibus obtusis, lobo intermedio ex ungui brevi transverse oblongo late ovato obtuso minute apiculato.

*Pseudobulbs* approximate to 1 cm. distant, slenderly elongate-ovoid, a little laterally flattened, at first covered with imbricating sheaths, c. 9.25 cm. long, when dry c. .80 cm. diam. at the base c. .30 cm. wide near the apex, 2-leaved. *Leaves* oblong-oblanceolate, acute, thinly coriaceous with c. 5 strong nerves, up to c. 10 cm. long, c. 3.25 cm. wide, petiole grooved c. 3-ribbed c. 1.75 cm. long. *Inflorescence* from the apex of the mature pseudobulb between the leaves, shorter than the leaves, few-flowered, peduncle nude slender elliptic in section c. 5 cm. long c. .10 cm. diam., rachis flexuous as long with internodes .25-.55 cm. long. *Bracts* caducous, not seen. *Flowers* appearing singly at intervals. *Dorsal sepal* oblong, triangular -acuminate, acute, 5-7-nerved, c. 2.30 cm. long, c. .70 cm. wide. *Lateral sepals* narrowly oblong-ovate, acute, subsigmoidly falcate, keeled on the back, 5-nerved with the outer nerves branched above the base, c. 2.30 cm. long, c. .60 cm. wide. *Petals* narrowly linear, subulate-acuminate, acute, 1-nerved, c. 1.90 cm. long, c. .13 cm. wide above the base. *Lip* 3-lobed, blade between the side lobes provided with 3 entire keels of which the median reaches to c. the middle of the blade the outer to above the base of the blade of the midlobe, spread out c. 2.20 cm. long, c. 1.25 cm. wide across the side lobes; side lobes broad, roundly triangular, very obtuse; midlobe shortly clawed with the claw transversely oblong and dilate a little upwards, blade broadly ovate obtuse minutely apiculate fleshy and transversely rugulose towards the margins the median line broadly elevate, the whole c. 1 cm. long, c. .80 cm. wide. *Column* arched above the middle, wings little roundly dilate from about the middle, hood rounded entire, c. 1.50 cm. tall, rostellum ovate, stigma deeply excavate suborbicular with elevate margins the anterior margin recurved. *Anther* ovate, grooved above, beak roundly triangular minutely retuse, c. .30 cm. long.

This is a close ally of *C. kinabaluensis* A. and S. but is much smaller in all parts.

S. 342, Dulit c. 2,000 feet altitude, August 27th, 1932, *P. M. Synge.* "Small tree trunk growing close to *C. exalata* Ridl. (S. 339). No scent. Labellum and hood pale pink. Column dirty white with brown tip."

Described from dried material.

**Cœlogyne Endertii** J. J. S. in Bull. Jard. Bot. Buit. Ser. 3. xi (1931), 94.

S. 502, Ulu Koyan c. 900 m., September 16th, 1932, *native collector.* "Growing on small tree c. 10 feet from the ground. Flower petals pale green, transparent. Labellum has crimson lower edge to side ridges and blotch just above tip. Column pale pink, brown at tip. No scent."

*Distribution:*—Endemic.

**Cœlogyne** (§ Longifoliæ) **planiscapa** sp. nov. Pseudobulbi elongato-ovoidei, leviter lateraliter compressi, 2-folii. Folia lineari-oblanceolata, acuta, rigida, coriacea, breviter petiolata. Inflorescentia in pseudobulbo maturo, flores intervallis singulatim gignens. Bracteæ caducæ, oblongo-ovatæ, acutæ. Sepalum dorsale oblongum, a medio fere acuminatum, obtusum, minute apiculatum. Sepala lateralia ovata, acuminata, anguste obtusa, minute apiculata. Petala linearia, subacuta, minute apiculata. Labellum 3-lobum, 3-carinatum, lobis lateralibus rotundatim triangularibus obtusis, lobo intermedio ex ungui late cuneato ovato subacuto margines versus incrassato et transverse ruguloso.

*Pseudobulbs* up to c. 3 cm. distant, elongate-ovoid, a little laterally flattened, ribbed, covered at first with c. 4 fleshy tubular sheaths, c. 7 cm. long, c. 1.50 cm. wide at the base, c. .60 cm. wide below the apex, 2-leaved. *Leaves* linear-oblanceolate, acute, rigid, coriaceous with c. 5 strong nerves, up to 21.50 cm. long, c. 2.70 cm. wide, petiole grooved 4-5 cm. long. *Inflorescence* from the apex of the mature pseudobulb between the leaves, elongate, stout, many-flowered, peduncle strongly laterally flattened and narrowly winged narrowly elliptic in section c. 17 cm. long c. .45 cm. wide c. .12 cm. through, rachis flexuous at least 24 cm. long with internodes up to 1.60 cm. long. *Bracts* caducous, imbricating at the apex of the rachis, oblong-ovate, acute, up to c. 5 cm. long. *Flowers* appearing singly at intervals, widely expanded, the sepals 5-nerved with the outer nerves branched from the base. *Dorsal sepal* oblong, acuminate from c. the middle, obtuse, minutely apiculate, c. 3.10 cm. long, c. 1.28 cm. wide. *Lateral sepals* ovate, acuminate, narrowly obtuse, minutely apiculate, keeled outside, a little longer and broader. *Petals* linear, subacute, minutely apiculate, 3-nerved, c. 2.83 cm. long, c. .27 cm. wide above the base. *Lip* 3-lobed, the blade between the side lobes

provided with 3 entire keels which rise above the base the median low reaching to 1/3 below the apex of the blade the outer 2 tall rather thin reaching to beyond the middle of the midlobe and terminating abruptly, fleshy, spread out c. 2.75 cm. long, c. 1.30 cm. wide across the side lobes; side lobes erect, falcate, roundly oblong-triangular, very obtuse; midlobe clawed with the claw subquadrate and a little cuneately dilate upwards c. .60 cm. long, blade ovate obtusely apiculate thickened and transversely wrinkled towards the margins with the median nerve elevate near the apex, in all c. 2 cm. long. *Column* arched above the middle, wings gently dilate from about the middle and very shortly roundly triangular at the apex, hood little rounded subquadrate nearly truncate entire, c. 1.85 cm. tall, rostellum roundly triangular keeled above, stigma subquadrate with greatly elevate recurved anterior margin. *Anther* conic, beak retuse, c. .37 cm. long. *Column foot* distinct, c. .25 cm. long. *Ovary* conspicuously 6-ribbed.

This is evidently a close ally of *C. cuprea* Wndl. & Krzl. from which it is at once readily distinguished by the vegetative parts.

S. 419 (type), Dulit ridge c. 4,000 feet altitude, September 6th, 1932, *P. M. Synge.* "Moss forest. Flower shell pink, tip of column brown, ridges on labellum pink."

S. 556, Dulit ridge c. 1300 m., October 5th, 1932, *P. M. Synge.* "Moss forest, epiphytic on small tree. Flower pale shell-pink, tip of column brown. No scent."

Described from dried material and a flower preserved in spirit.

**Cœlogyne Naja** J. J. S. in Bull. Jard. Bot. Buit. Ser. 3. xi (1931), 93.

S. 539, Dulit ridge c. 850 m., September 22nd, 1932, *native collector.* "Small tree in sandy forest c. 3 feet from the ground. Flowers shell pink. No scent. Leaves reddish brown."

*Distribution:*—Endemic.

**Cœlogyne Rochussenii** De Vr. Ill. Orch. (1854), t. 2; t. II, f. 6.

2212, Dulit under 300 m., October 14th, 1932, *P. W. Richards.* "Epiphytic on tree in secondary forest on river bank c. 5-6 m. from the ground. Six outer perianth segments pale greenish yellow, labellum white with lemon yellow markings; inner perianth segment opposite labellum white, inner lateral segments white striped with dull orange."

*Distribution:*—Sumatra, Java, Malay Peninsula, Celebes, Sula Islands, Philippines.

**Cœlogyne hirtella** J. J. S. in Bull. Jard. Bot. Buit. Ser. 3. xi (1931), 105.

S. 442, Dulit ridge c. 4,000 feet altitude, September 8th, 1932, *P. M. Synge.* "Small tree in transitional moss forest. Flowers white, orange stripes on ridges of labellum. Tip of column brown. Sweet scent."

S. 417, Dulit ridge c. 4,300 feet altitude, September 6th, 1932, *T. H. Harrison.* "Moss forest. Flowers white, labellum with orange and brown ridges, brown tip to columns."

*Distribution:*—Endemic.

**Cœlogyne rhabdobulbon** Schltr. in Notiz. Berl. viii (1921), 15.

2480, Ulu Koyan c. 1000 m., November 7th, 1932, *P. W. Richards.* "On ground on edge of clearing in 'heath' forest. Perianth white, crests on labellum dull yellow."

*Distribution:*—Endemic.

**Cœlogyne pandurata** Lndl. Fol. Orch. Cœlog. (1852), 7; Bot. Mag. t. 5084.

S. 413, Dulit ridge c. 4,000 feet altitude, September 6th, 1932, *T. H. Harrison.* "Small tree in moss forest. Flowers pale yellow. Pink labellum dark brown with light brown ridges."

*Distribution:*—Sumatra, Malay Peninsula.

**Cœlogyne peltastes** Rchb. f. in Gard. Chron. (1880), II. 296.

S. 4, Marudi near sea level, July 25th, 1932, *P. M. Synge.* "Epiphyte c. 4 feet from the ground on dead bough. Scentless. Sepals green. Labellum green with brown spots, frilled edge."

2657, Forest reserve Marudi under 300 m., November 1932, *P. W. Richards.* "Epiphyte on tree trunks near the ground, 'heath' forest. Perianth segments pale green, inside of labellum and its wings marked with dark red."

*Distribution:*—Endemic.

**Cœlogyne exalata** Ridl. in Journ. Roy. As. Soc. Str. Br. xlix (1908), 29; *C. subintegra* J. J. S. in Bull. Dep. Agr. Ind. neerl. xxii (1909), 12; Bull. Jard. Bot. Buit. II. Suppl. (1930), t. 14, f. I.

S. 338, Dulit 3,000 feet altitude, August 27th, 1932, *P. M. Synge.* "Tree trunk c. 30 feet from the ground in primary forest. No scent. Labellum and 2 side petals and large side petal of outer whorl brownish green. Hood of post petal and column white with brown tip."

S. 339, Dulit c. 2,000 feet altitude, August 26th, 1932, *P. M. Synge.* "Flowers brownish orange. Column white with brown tip."

*Distribution:*—Endemic.

**Chelonistele kutaiensis** comb. nov. *Coelogyne kutaiensis* J. J. S. in Bull. Jard. Bot. Buit. Ser. 3, xi (1931), 99.

S. 545, Dulit ridge c. 1250 m., September 25th, 1932, *P. M. Synge.* "Moss forest. Growing on the ground among moss, common. All plants coming into flower about same date. Flowers white, yellow stripe on labellum. Internal petals very pale pink. Tip of column or hood brown. Sheaths at base pale pink. Sweet scent."

*Distribution:*—Endemic.

**Chelonistele unguiculata** sp. nov. Pseudobulbi approximati, graciliter elongato-ovoidei, 1-folii. Folium lanceolatum ad oblongo-oblanceolatum, breviter acuminatum, acutum, crasse coriaceum, longe petiolatum. Inflorescentia folio valde juvenili synantha, laxe ad c. 10-flora. Bracteæ caducæ. Sepalum dorsale late oblongo-lanceolatum, obtusum. Sepala lateralia similia, extus carinata. Petala anguste oblongo-lanceolata, obtusa. Labellum usque ad medium unguiculatum, 3-lobum, bicarinatum, carinis basin prope ortis super basin lobi intermedii in lamellam triangularem obtusam antice truncatam dilatatis, ungui lineari, lobis lateralibus cuneatis obtusissimis vel subtruncatis, lobo intermedio obcordato marginibus undulatis lobis apicalibus oblongis obtusis dente triangulari in sinu addito. Gynostemii alæ e basi sensim dilatatæ.

*Pseudobulbs* approximate, cylindric or slenderly elongate-ovoid, wrinkled, at first covered with imbricating sheaths, up to c. 5.50 cm. long, base c. .60 cm., near the apex c. .25 cm. diam. when dried, 1-leaved. *Leaf* lanceolate to oblong-oblanceolate, shortly acuminate, acute and pungent, keeled beneath, very thickly fleshy and coriaceous, rather abruptly narrowed to the petiole, c. 8-11.50 cm. long, 1.50-3.33 cm. wide, petiole grooved up to c. 6.50 cm. long. *Inflorescence* appearing from within the very young leaf, laxly up to c. 10-flowered, peduncle erect almost entirely concealed by the leaf sheaths c. 7 cm. long, rachis arched up to c. 11.50 cm. long with internodes up to c. 1.50 cm. long. *Bracts* caducous, not seen. *Dorsal sepal* broadly oblong-lanceolate, obtuse, 7-nerved, c. 1.80 cm. long, c. .65 cm. wide. *Lateral sepals* similar, subacute, keeled on the back, c. 1.90 cm. long, c. .65 cm. wide. *Petals* narrowly oblong-lanceolate, obtuse, 3-nerved, c. 1.85 cm. long, c. .37 cm. wide. *Lip* 3-lobed, clawed to beyond the middle, provided with 2 keels which rise just above the base and terminate abruptly above the base of the midlobe in a tall triangular obtuse lamella with truncate anterior margin,

spread out c. 2.10 cm. long, c. 1.40 cm. wide across the side lobes; claw linear c. 1.10 cm. long, c. .30 cm. wide; side lobes arising beyond the middle of the lip, cuneate, apex very obtuse or subtruncate, c. .50 cm. long, c. .27 cm. wide near the apex; midlobe obcordate from a very shortly clawed (.07-.16 cm.) base, rather deeply bilobed with the lobes oblong obtuse minutely erose and a small triangular tooth in the sinus, margins undulate, c. .70 cm. long and as broad. *Column* nearly straight, c. 1.60 cm. tall, wings gradually dilate from the base a little constricted above the middle and ending in a triangular obtuse lobe, hood semiorbicular entire or very inconspicuously toothed, rostellum elongate narrowly triangular truncate, stigma suborbicular with the anterior margin strongly elevate. *Anther* ovate, beak triangular obtuse or very inconspicuously retuse.

A very distinct member of the genus by reason of the long claw of the lip the keels of which are abruptly dilate on the base of the midlobe into a tall triangular lamella and the comparatively broad petals.

S. 399 (type), Dulit ridge c. 4,000 feet altitude, September 6th, 1932, *P. M. Synge.* "Flowers white, yellow ridges on labellum. Sweet scent. Common in moss forest."

2420, Gunong Laiun, Sungei Balapau, Ulu Tinjar, c. 1100 m., November 2nd, 1932, *P. W. Richards.* "Epiphyte on base of trees in moss forest, very abundant. Perianth white, lobes of labellum yellow."

Described from dried plants.

**Chelonistele lamellulifera** sp. nov. Pseudobulbi approximati, cylindrici vel graciliter elongato-ovoidei, 1-folii. Folium oblanceolatum vel lineari-oblanceolatum, breviter acuminatum, acutum, coriaceum. Inflorescentia folio juvenili synantha, pauciflora. Bracteæ caducæ. Sepalum dorsale ellipticum obtusum. Sepala lateralia ovato-lanceolata, obtusa. Petala linearia, obtusa. Labellum 3-lobum, basi breviter cuneato-unguiculatum, lamina inter lobos laterales lamellis 2 semiorbicularibus vel crescentiformibus erectis carnosis donata, costa media elevata, lobis lateralibus falcatis triangulari-oblongis obtusis, lobo intermedio e basi breviter cuneata ovato obtuso vel minute bilobulo dente minuto in sinu. Gynostemium breve, super basin constrictum, alis sub medio subito dilatatis apici triangularibus, ala apicali leviter rotundata denticulata.

*Pseudobulbs* approximate, cylindric or slenderly elongate-ovoid, wrinkled, at first concealed by imbricating sheaths, up to c. 8.50 cm. long, when dry c. .75 cm. wide near the base, c. .33 cm. wide near the apex, 1-leaved. *Leaf*

oblanceolate or linear-oblanceolate, shortly acuminate, acute, coriaceous, keeled beneath, 17-29 cm. long, 2.30-4.80 cm. wide, gradually narrowed to the petiole, petiole grooved up to c. 8 cm. long. *Inflorescence* from within the young leaf, erect, few-flowered, peduncle almost entirely concealed by the leaf c. 8 cm. long, rachis subflexuous c. 6 cm. long with internodes up to c. .90 cm. long. *Bracts* caducous before the opening of the flower, c. 2.60 cm. long. *Flowers* well expanded, rather fleshy. *Dorsal sepal* elliptic, obtuse, 5-nerved, c. 1.30 cm. long, c. .58 cm. wide. *Lateral sepals* ovate-lanceolate, obtuse, a little falcate above the base, 5-nerved, c. 1.30 cm. long, c. .58 cm. wide. *Petals* linear, narrowed towards the obtuse apex, 1-nerved, c. 1.30 cm. long, c. .15 cm. wide. *Lip* 3-lobed, fleshy, clawed, provided between the side lobes with 2 short fleshy erect semiorbicular or crescent-shaped lamellæ, spread out c. 1.20 cm. long, c. .95 cm. wide across the side lobes; claw saccate, cuneate, c. .15 cm. long, c. .30 cm. wide at the apex; side lobes suberect, falcate, triangular-oblong, obtuse, anterior margin c. .20 cm. long; midlobe recurved, clawed for c. .15 cm., blade ovate obtuse or minutely bilobed with a minute tooth in the sinus, median nerve elevate, provided on each side with a narrow oblique groove from near the margin at the base to the apex, c. .75 cm. long and as broad. Column short, constricted above the base, abruptly and broadly dilate c. 1/3 above the base, hood short rounded denticulate, c. .54 cm. tall, c. .45 cm. wide in the middle, stigma large ovate with elevate margins, rostellum short triangular.

This curious and very distinct species is well characterized by the saccate claw of the lip which bears 2 short lamellæ in place of the usual keels, and the short column.

S. 531 (type), Dulit ridge c. 1250 m., September 19th, 1932, *P. M. Synge*. "Growing on bank in moss forest. Flowers with pale green petals. Brown markings on centre and on labellum. Stem surrounded by pale green sheaths. Sweet scent."

S. 423, Dulit ridge c. 4,000 feet altitude, September 6th, 1932, *P. M. Synge*. "Moss forest, common. Flowers green, brown tip to column. Slight sweet smell."

Described from dried plants.

**Chelonistele Richardsii** sp. nov. Pseudobulbi parvi, ovoidei, bifolii. Folia elliptica vel oblongo-elliptica, acuta, crasse carnosa, basi petiolata. Inflorescentia foliis valde juvenilibus synantha, rachide nutante pauciflora. Bracteæ caducæ. Sepalum dorsale oblongo-obovatum, obtusum. Sepala lateralia falcata, oblongo-ovata,

subacuta. Petala anguste lanceolata, acuminata, anguste obtusa. Labellum unguiculatum, 3-lobum, ungui oblongo concavo, super unguem carinis 2 valde abrupte elevatis medio unguicis lobi intermedii evanescentibus basi in lobulum brevem extrorsum productis, lobis lateralibus minimis falcate triangularibus subacutis, lobo intermedio unguiculato ungui oblongo apicem versus cuneato-dilatato lamina abrupte dilatata latissime ovata apici biloba. Gynostemium basi tubercula parva donatum; alis in 1/3 parte inferiore valde dilatatis triangularibus obtusis apici incurvis, ala apicali vix rotundata denticulata.

*Pseudobulbs* c. 1 cm. distant, ovoid, wrinkled, forming an acute angle with the rhizome, rather concave beneath, c. 2 cm. long, c. .60 cm. wide, 2-leaved. *Leaves* elliptic or oblong-elliptic, acute, margins a little recurved, thickly fleshy, grooved above, keeled beneath, c. 4 cm. long, c. 1.40 cm. wide, petiole grooved c. 1.70 cm. long. *Inflorescence* from between the very young leaves, peduncle nude c. 6 cm. long, rachis nodding laxly c. 9-flowered c. 7.50 cm. long with internodes up to c. 1 cm. long. *Bracts* caducous, not seen. *Dorsal sepal* oblong-obovate, obtuse, 5-nerved, c. .87 cm. long, c. .47 cm. wide. *Lateral sepals* falcate, oblong-ovate, subacute, 5-nerved, c. .90 cm. long, c. .40 cm. wide. *Petals* narrowly lanceolate, acuminate, narrowly obtuse, 3-nerved, c. .77 cm. long, c. .15 cm. wide. *Lip* shortly clawed, 3-lobed, blade provided between the side lobes with 2 short keels which reach to about the middle of the claw of the midlobe and are produced at the abruptly elevate base to a short rounded extrorse lobe, spread out including the claw c. 1.30 cm. long, c. .83 cm. wide across the blade of the midlobe; claw oblong, concave, minutely papillose, c. .20 cm. long; side lobes erect, tooth-like, falcate, triangular, subacute, hardly .10 cm. long; midlobe provided at the base with an oblong claw which is cuneately dilate in the upper half, blade abruptly dilate very broadly ovate or obreniform deeply bilobed with the lobes acutely divergent broadly cuneate with gently rounded apex, c. .90 cm. long, c. .83 cm. wide. *Column* c. .50 cm. tall, provided at the base with a small conic tubercle, wings dilate from below the middle roundly triangular obtuse incurved over the face of the column, hood gently rounded denticulate, rostellum oblong obtuse, stigma suborbicular with strongly elevate margins.

Another very distinct species readily distinguished by the 2 short fleshy leaves, the small flowers, the keels of the lip produced at the base to a short auricle and the tubercle at the base of the column.

S. 59, Dulit ridge, August 1st, 1932, *P. W. Richards.* "Moss forest, odourless. Flowers greenish yellow, brown fringe to labellum, yellow lines on stigma."

Described from a single dried plant and a flower preserved in spirit.

**Pholidota ventricosa** Rchb. f. in Bonpl. v (1857), 43.

2422, Gunong Laiun, Sungei Balapau, Ulu Tinjar c. 900-1000 m., November 2nd, 1932, *P. W. Richards.* "Fallen log in rain forest on ridge. Perianth greenish yellow."

*Distribution:*—Sumatra, Java, Philippines.

**Pholidota carnea** Lndl. Gen. & Sp. Orch. (1830), 37.

S. 440, Dulit ridge c. 1230 m., September 7th, 1932, *P. M. Synge.* "Small tree in moss forest. Flowers pale pink, tip of column brown."

S. 443, Dulit ridge c. 4,000 feet altitude, September 7th, 1932, *native collector.* "Transitional moss-rain forest. Flowers very pale pink, tip of labellum brown."

S. 460, Dulit ridge c. 1240 m., September 10th, 1932, *P. M. Synge.* "Moss forest. Flowers small pale pink. No scent. Rather common.

*Distribution:*—Sumatra, Java, Malay Peninsula, Philippines.

**Pholidota gibbosa** De Vr. Ill. Orch. (1854), t. v, f. 1; t. xi, f. 62.

S. 549, Dulit ridge c. 1200 m., October 3rd, 1932, *P. W. Richards.* "Moss forest growing on tree. Labellum and hood pale shell pink fading to cream on ledge of labellum. Tip of column brown. No scent."

*Distribution:*—Sumatra, Java, Malay Peninsula.

**Dendrochilum brevilabratum** Pfitz. in Engl. Pflanzenr. xxxii (1907), 89: *Platyclinis brevilabrata* Rendle in Journ. Bot. xxxix (1901), 173.

S. 100, Dulit c. 250 feet above camp, August 5th, 1932, *native collector.* "Pseudobulbs yellowish. Flowers white, scentless."

S. 175, Dulit under 300 m., August 11th, 1932, *native collector.* "Flowers small, white, scentless."

*Distribution:*—Endemic.

**Dendrochilum longirachis** Ames Orch. vi (1920), 60.

S. 483, Ulu Koyan c. 1200 m., September 15th, 1932, *P. W. Richards.* "Sand forest. Tree trunk near ground. Flower very pale green, brown stripes on labellum. Slight sweet scent."

*Distribution:*—Endemic.

**Dendrochilum** (§ Platyclinis) **gracilipes** sp. nov. Pseudobulbi gracillime cylindrici, 1-folii. Folium lanceolatum vel oblanceolatum, obtusum. Inflorescentia elongata,

multiflora. Bracteæ ovatæ, obtusæ. Sepalum dorsale lanceolatum, subacutum. Sepala lateralia basi subfalcata, anguste ovato-lanceolata, acuminata, subacuta. Petala anguste oblongo-lanceolata, breviter acuminata, acuta. Labellum valde inconspicue 3-lobum, inter lobos laterales carinis 2 basi conjunctis donatum nerva media breviter elevata, lobis lateralibus vix distinctis, marginibus erosulis, lobo intermedio ovato obtuso marginibus minute erosulis. Gynostemii stelidia sub medio orta, linearia, subacuta, ala apicali integra oblonga acuminata subacuta.

*Pseudobulbs* approximate to 2 cm. distant, elongate, very slender, cylindric, at first covered in the lower ½ with c. 5 tubular membraneous sheaths, up to c. 15.50 cm. long, when dried c. .30 cm. diam. near the base .18 cm. diam. near the apex, 1-leaved. *Leaf* lanceolate or oblanceolate, obtuse, thinly coriaceous with c. 7 strong nerves, up to c. 20 cm. long, c. 3 cm. wide, petiole grooved up to c. 3 cm. long. *Inflorescence* elongate, erect, very many-flowered, peduncle rather stout terete provided with a sterile appressed bract-like sheath below the rachis c. 14 cm. long, rachis c. 25 cm. long with internodes up to .60 cm. long. *Bracts* ovate, obtuse, 5-nerved, c. .35 cm. long, c. .25 cm. wide. *Dorsal sepal* lanceolate, subacute, 3-nerved, c. .65 cm. long, c. .17 cm. wide. *Lateral sepals* subfalcate at the base, narrowly ovate-lanceolate, acuminate, subacute, 3-nerved, c. .65 cm. long, c. .20 cm. wide. *Petals* narrowly oblong-lanceolate, shortly acuminate, acute, 3-nerved, c. .65 cm. long, c. .15 cm. wide. *Lip* recurved above the base, very inconspicuously 3-lobed, provided between the side lobes with 2 short tall keels which are joined at the base and a little introrse in the upper ½ reaching to above the base of the midlobe, median nerve shortly elevate, spread out c. .50-.57 cm. long, c. .33 cm. wide across the midlobe; side lobes very obscure with margins minutely erose; midlobe ovate, obtuse, margins minutely erose sometimes papillose or minutely ciliolate, c. .35-.40 cm. long, c. .35 cm. wide. *Column* c. .30-.33 cm. tall, stelidia from a little below the middle linear subacute nearly as long as the hood, hood entire oblong acuminate subacute.

This plant is well characterized by the elongate very slender stem-like pseudobulbs.

S. 405, Dulit ridge c. 4,000 feet altitude, September 5th, 1932, *T. H. Harrison.* "Moss forest. Flowers cream. Slight scent."

S. 418 (type), Dulit ridge c. 4,300 feet altitude, September 6th, 1932, *P. M. Synge.* "Moss forest. Flowers pale green, tip of column white. Stalks of leaves pinkish."

S. 482, Ulu Koyan c. 1200 m., September 15th, 1932, *P. W. Richards.* "Flowers pale green."

S. 512, Dulit ridge c. 950 m., September 17th, 1932, *C. H. Hartley.* "Flowers pale green. No scent."

Described from dried plants.

**Dendrochilum** (§ Platyclinis) **Dewindtianum** W. W. Sm. var. **sarawakense** var. nov. Pseudobulbi approximati vel subapproximati, ovoidei, 1-folii. Folium lineare, apici acutum vel subobtusum conduplicatum, petiolo brevi. Inflorescentia folio juvenili synantha, laxe c. 10-flora. Bracteæ ovatæ, obtusæ. Sepala dorso carinata, lanceolata, breviter acuminata, acuta. Petala oblongo-lanceolata, breviter acuminata, acuta. Labellum 3-lobum, intus carinis 2 basi conjunctis apicem labelli prope evanescentibus interdum basi utrinque in dentem minimum productis, nerva media elevata, lobis lateralibus usque ad medium labelli attingentibus parte libera brevi subulata marginibus erosulis, lobo intermedio obovato obtuso marginibus apicem versus erosulis. Gynostemii stelidia sub medio orta, usque ad rostellum attingentia, ala apicali rotundatim triangulari subacuta integra.

*Pseudobulbs* approximate to .50 cm. distant, ovoid, wrinkled, at first covered with tubular membraneous sheaths which break up to fibres, c. 2 cm. long, c. .60 cm. diam., 1-leaved. *Leaf* linear, apex conduplicate acute or subobtuse, thinly coriaceous, often with margins more or less recurved when dry, c. 5.90 cm. long, c. .60 cm. wide, petiole grooved c. 2 cm. long. *Inflorescence* appearing from within the young folded leaf, erect, lax, c. 10-flowered, peduncle provided with c. 2 bract-like sheaths c. 3.50 cm. long, rachis c. 4.50 cm. long with internodes up to .50 cm. long. *Bracts* ovate, obtuse, 3-nerved, c. .30 cm. long, c. .24 cm. wide. *Sepals* keeled on the back, the laterals conspicuously so, lanceolate, shortly acuminate, acute, the laterals subfalcate, 3-nerved, c. .60 cm. long, the dorsal c. .18 cm. the laterals c. .22 cm. wide. *Petals* oblong-lanceolate, shortly acuminate, acute, sometimes inconspicuously clawed at the base, 3-nerved, c. .57 cm. long, c. .18 cm. wide. *Lip* 3-lobed, blade provided with 2 keels which reach almost to the apex of the lip and are joined at the base by a short transverse ridge which sometimes bears a minute extrorse tooth on each side, median nerve elevate for the whole length, spread out c. .50 cm. long, .20-.30 cm. wide across the midlobe; side lobes reaching to about the middle of the lip or a little beyond, the free part short subulate, posterior margin minutely erose below the apex; midlobe obovate obtuse,

margins minutely erose towards the apex, c. .26 cm. long, .20-.30 cm. wide. *Column* .33-.38 cm. tall, stelidia arising from below the middle and reaching to the rostellum, hood entire roundly triangular subacute of obtuse. *Column foot* distinct, minute.

The variety here described differs from the species principally in the more slender habit.

S. 186, Dulit c. 700 m., August 13th, 1932, *E. Shackleton.* "Tree trunk among moss. Slightly sweet scent. Flowers greenish yellow, labellum green at the base with brown patch on end. Pseudobulbs yellowish."

S. 558, Dulit ridge c. 1300 m., October 7th, 1932, *native collector.* "Moss forest growing on small tree. Flowers green. No scent."

Described from dried plants.

**Dendrochilum** (§ Platyclinis) **dulitense** sp. nov. Pseudobulbi approximati, minimi, ovoidei vel subglobosi, 1-folii. Folium lineare, obtusum. Inflorescentia gracilis, laxe c. 6-flora. Bracteæ oblongo-ovatæ, brevissime acuminatæ, acutæ. Sepala ovato-lanceolata, acuta. Petala anguste ovata, longe acuminata, acuta. Labellum 3-lobum, intus ad basin carinis brevibus 2 basi conjunctis donatum, nerva media breviter elevata, lobis lateralibus retrorsim triangularibus margine antico erosulis, lobo intermedio transverse elliptico obtusissimo. Gynostemii stelidia super basin orta, brevia, cuneata, apici vix rotundata vel subtruncata, vix usque ad medium attingentia, ala apicali rotundata integra.

*Pseudobulbs* approximate, very small, ovoid or subglobose, minutely wrinkled, up to c. .50 cm. tall, c. .30 cm. diam., 1-leaved. *Leaf* linear, obtuse, coriaceous, margins often revolute in the dried plant, c. 2 cm. long, c. .20 cm. wide, petiole grooved c. .25 cm. long. *Inflorescence* from within the unexpanded leaf, erect or nodding, slender, laxly c. 6-flowered, peduncle nude c. 1.70 cm. long, rachis c. 2.50 cm. long. *Bracts* oblong-ovate, very shortly acuminate, acute, 3-nerved, c. .18 cm. long. *Sepals* ovate-lanceolate, acute, 3-nerved, c. .50 cm. long, c. .15 cm. wide, the laterals subfalcate acuminate c. .18 cm. wide. *Petals* narrowly ovate, long acuminate, acute, 1-nerved, c. .47 cm. long, c. .13 cm. wide. *Lip* 3-lobed, 3-nerved, the blade provided inside at the base with 2 short keels which are joined at the base by a short transverse ridge, median nerve elevate to base of midlobe, spread out c. .43 cm. long, c. .37 cm. wide across the midlobe; side lobes retrorse, triangular, subacute, reaching to c. the middle of the lip, the anterior

margin minutely erose; midlobe transversely elliptic, very obtuse, broader than long. *Column* arched, c. .28 cm. tall, stelidia arising just above the base short cuneate apex scarcely rounded or subtruncate, reaching about to the middle, hood short entire roundly triangular obtuse, rostellum large porrect ovate, stigma transversely oblong elevate along the anterior margin.

A minute plant with comparatively large flowers and a characteristic lip.

S. 435, Dulit ridge c. 1230 m., September 7th, 1932, *P. M. Synge*. "Small tree in moss forest. Petals pink, labellum pale yellow. Stalk pale pink."

Described from dried material.

**Dendrochilum** (§ Platyclinis) **integrilabium** sp. nov. Pseudobulbi ad c. .30 cm. dissiti, fusiformes, 1-folii. Folium angustissime lineare, apicem versus leviter dilatatum, obtusum, minute apiculatum. Inflorescentia e folio fere maturo, erecta, gracillima, dimidio superiore multiflora. Bracteæ ellipticæ. Sepalum dorsale oblongo-lanceolatum, acutum. Sepala lateralia ovato-lanceolata, acuta, falcata. Petala linearia, acuta, medio fere leviter dilatata. Labellum integrum, explanatum oblongo-ellipticum, obtusum, intus super basin carinis conspicuis 2 ¼ sub apice attingentibus basi conjunctis. Gynostemii stelidia basalia, gynostemio vix æquilonga, linearia, acuta, ala apicali rotundatim triangulari obtuso.

*Pseudobulbs* up to c. .30 cm. distant, at first concealed by membraneous tubular sheaths, fusiform, minutely wrinkled, forming an acute angle with the rhizome, up to c. 1.50 cm. long, c. .25 cm. diam., 1-leaved. *Leaf* narrowly linear, a little dilate upwards, apex obtuse minutely apiculate, rather thin in texture with the median nerve elevate beneath, up to c. 6.70 cm. long, c. .28 cm. wide, petiole grooved very slender c. .65 cm. long. *Inflorescence* appearing with the nearly mature leaf, erect, very slender, many-flowered, peduncle provided beneath the rachis with 1-2 empty bract-like sheaths up to c. 6 cm. long c. .03 cm. diam., rachis c. 6 cm. long. *Bracts* elliptic, shortly acuminate, acute, 1-nerved, c. .13 cm. long. *Dorsal sepal* oblong-lanceolate, acute, 1-nerved, c. .23 cm. long, c. .07 cm. wide. *Lateral sepals* ovate-lanceolate, acute, falcate, 1-nerved, c. .23 cm. long, c. .08 cm. wide. *Petals* linear, acute, a little dilate about the middle, 1-nerved, c. .20 cm. long, c. .03 cm. wide. *Lip* entire, provided inside above the base with 2 conspicuous keels which reach to about ¼ below the apex and are joined at the base by a transverse ridge, recurved above the base, when spread out oblong-elliptic,

apex fleshy obtuse, c. .13 cm. long, c. .04 cm. wide. *Column* c. .12 cm. tall, stelidia arising from the base and reaching nearly to the apex linear acute, hood roundly triangular entire, rostellum large triangular subacute, stigma suborbicular with the anterior margin elevate.

A small-flowered species characterized by the very small entire lip recalling that of section *Eudendrochilum.*

S. 484, Ulu Koyan c. 1200 m., September 15th, 1932, *P. W. Richards.* "Tree trunk c. 2 m. from the ground in sandy forest. Flowers very pale green."

Described from dried plants.

**Dendrochilum exasperatum** Ames Orch. vi (1920), 50.

S. 436, Dulit ridge c. 1230 m., September 6th, 1932, *P. M. Synge.* "Small tree in moss forest. Flowers pale brown. No scent."

*Distribution:*—Endemic.

**Dendrochilum** (§ Platyclinis) **sublobatum** sp. nov. Pseudobulbi approximati, cylindrici, 1-folii. Folium angustissime lineari-oblanceolatum, obtusum, minute apiculatum. Inflorescentia ex apice pseudobulbi maturi, elongata, multiflora. Bracteæ ovatæ, acutæ. Sepalum dorsale lanceolatum, acutum. Sepala lateralia oblongo-ovata, subacuta, falcata. Petala oblanceolata, acuta, falcata. Labellum breviter unguiculatum, lamina dimidio inferiore subquadrata lateribus leviter incisis, dimidio superiore triangulari acuminata acuta basi carina hippocrepidiformi donata. Gynostemii stelidia basalia, linearia, obtusa, usque ad antheram attingentia, ala apicali triangulari obtusissima.

*Pseudobulbs* approximate, cylindric, wrinkled, at first covered with membraneous sheaths, 1-leaved. *Leaf* very narrowly linear-oblanceolate, obtuse, minutely apiculate, thinly coriaceous with c. 3 strong nerves, 9-16 cm. long, .30-50 cm. wide, base narrowed gradually to a grooved petiole 1-2.80 cm. long. *Inflorescence* from the apex of the mature pseudobulb, longer than the leaf, erect, many-flowered, peduncle nude 1.20-5 cm. long c. .07 cm. diam., rachis up to 17.50 cm. long with internodes up to c. .30 cm. long. *Bracts* ovate, acute, 1-nerved, c. .10 cm. long or 1/3 shorter than pedicel and ovary. *Dorsal sepal* lanceolate, acute, 3-nerved, c. .25 cm. long, c. .09 cm. wide. *Lateral sepals* oblong-ovate, subacute, falcate, 3-nerved, c. .20 cm. long, c. .10 cm. wide. *Petals* oblanceolate, acute, falcate, 1-3-nerved, c. .22 cm. long, c. .06 cm. wide. *Lip* shortly clawed, blade inconspicuously 5-lobed subquadrate in the lower ½ with sides a little narrowed about the middle triangular acuminate acute in the upper ½, provided at the

base with a conspicuous horse-shoe keel, spread out c. .15 cm. long, c. .09 cm. wide. Column c. .15 cm. tall, stelidia basal linear obtuse reaching to the anther, hood entire triangular very obtuse, rostellum large broadly rounded.

A small species of the affinity of *D. dolichobrachium* (Schltr.) Ames, *D. Gibbsiae* Rolfe and *D. Haslamii* Ames. From all of these it differs in the smaller flowers with much less conspicuously lobed lip and much shorter stelidia.

S. 406 (type), Dulit ridge c. 4300 feet altitude, September 5th, 1932, *P. M. Synge.* "Small trees in moss forest. Flowers small, greenish yellow, tip of column brown. Very slight sweet scent."

2290, Dulit c. 1230 m., October 18th, 1932, *J. Ford.* "Moss forest. Flowers greenish yellow."

Described from dried plants.

**Dendrochilum** (§ Platyclinis) **anomalum** sp. nov. Pseudobulbi ovoidei, 1-folii. Folium oblongo-ellipticum, breviter obtuse apiculatum, basi in petiolum brevem abrupte angustatum. Inflorescentia folio inexplanato synantha, elongata, dimidio superiore multiflora. Bracteæ late ovatæ, subacutæ. Sepalum dorsale anguste oblongum, acutum. Sepala lateralia oblongo-lanceolata, breviter acuminata, acuta. Petala anguste oblongo-oblanceolata, acuta. Labellum 3-lobum, lamina inter lobos laterales carina V-formiter donata carina paullo longiore apicem versus leviter dilatata utrinque addita; lobi laterales triangulares, subacuti, margine postico erecto sub apice rotundatim dilatato, apicem versus recurvi et transverse plicati; lobus intermedius valde recurvus, ovatus, subacutus, inconspicue tricarinatus. Gynostemium elongatum, papillosum, stelidiis sub stigmate ortis anguste triangularibus acutis falcatis, ala apicali super basin triangularem transverse oblonga apici truncata et erosula.

*Pseudobulbs* approximate to .70 cm. distant, ovoid, wrinkled, at first covered with rather fleshy imbricating sheaths, c. 2.30 cm. long, c. .75 cm. diam. in the dried plant, 1-leaved. *Leaf* oblong-elliptic, shortly obtusely apiculate, thinly coriaceous with c. 9 strong nerves, margins a little recurved, c. 9.33 cm. long, c. 3.33 cm. wide, the base rather abruptly narrowed to a grooved petiole c. 1.75 cm. long. *Inflorescence* from within the unexpanded leaf, elongate, many-flowered, peduncle terete rather stout provided below the rachis with some imbricating bract-like appressed sheaths c. 16 cm. long c. .10 cm. diam., rachis c. 17.50 cm. long with internodes c. .40 cm. long. *Bracts* greatly

exceeding the pedicel and ovary, broadly ovate, subacute, c. .55 cm. long, c. .48 cm. wide. *Dorsal sepal* narrowly oblong, acute, 3-nerved, c. .63 cm. long, c. .18 cm. wide. *Lateral sepals* oblong-lanceolate, shortly acuminate, acute, inconspicuously sigmoidly curved, 3-nerved, c. .68 cm. long, c. .21 cm. wide. *Petals* narrowly oblong-oblanceolate, acute, subfalcate, 3-nerved, c. .60 cm. long, c. .12 cm. wide. *Lip* anomalous and recalling that of a *Coelogyne,* 3-lobed from the middle, the blade between the side lobes provided with a V-shaped keel from above the base to c. ¼ below the base of the midlobe, a thinner little longer keel dilate towards the apex on each side, the blade parallel to the column, minutely papillose beneath, spread out c. .60 cm. long, c. .30 cm. wide across the side lobes; side lobes triangular, subacute, margins minutely papillose towards the apex, posterior margin erect roundly dilate below the apex, recurved towards the apex with a short transverse fold; midlobe abruptly and strongly recurved, ovate, subacute, fleshy, minutely transversely wrinkled, provided with 3 inconspicuous broad rounded keels from the base to below the apex, very minutely papillose above and beneath, margins minutely erose, c. .30 cm. long and as broad. *Column* papillose, c. .42 cm. long, stelidia arising from below the stigma short narrowly triangular falcate papillose c. .07 cm. long, hood transversely oblong above the triangular base apex truncate and minutely erose, stigma transversely oblong anterior margin elevate. *Column foot* papillose, c. .06 cm. long. *Ovary* warty, c. .17 cm. long, pedicel c. .20 cm. long.

This very distinct species appears to have no near allies in the genus. The curious lip structure, much more resembling a *Coelogyne* and the tall papillose column with short curved stelidia arising from just below the stigma are very characteristic features.

2497, Ulu Koyan c. 800-1000 m., November 7th, 1932, *native collector.* "Heath forest. Outer perianth segments dull orange-yellow, labellum orange, central parts red."

Described from a dried plant and flowers preserved in spirit.

**Dendrochilum bigibbosum** J. J. S. in Bull. Dep. Agr. Ind. neerl. xlv (1911), 13; Bull. Jard. Bot. Buit. II. Suppl. (1930), t. 16, f. 1.

S. 156, Dulit c. 300 m., August 10th 1932, *Mc Leod.* "Fallen tree near crown. Flowers greenish orange, labellum orange-brown and green at base. Column yellow. No scent."

*Distribution:*—Endemic.

**Dendrochilum** (§ Platyclinis) **hologyne** sp. nov. Pseudobulbi ad c. 2.75 cm. dissiti, anguste cylindrici, 1-folii. Folium anguste lineari-oblanceolatum, acutum. Inflorescentia elongata, gracillima, apicem versus dense multiflora. Bracteæ late triangulari-ovatæ. Sepalum dorsale oblongo-lanceolatum, anguste obtusum. Sepala lateralia oblongo-ovata, obtusa. Petala oblonga, acuminata, acuta. Labellum integrum, concavum, triangulari-ovatum vel oblique subquadratum, obtusum, intus dimidio inferiore carinis 3 donatum, carina intermedia parva tuberculiformi, carinis exterioribus divaricatis dimidio superiore incurvis et valde dilatatis. Gynostemium exalatum, rostello suberecto triangulari.

*Rhizome* long-creeping, emitting 2-3 roots from each node, c. .20 cm. diam,, internodes up to c. .70 cm. long. *Pseudobulbs* up to c. 2.75 cm. distant, narrowly cylindric, wrinkled, at first covered by tubular imbricating membraneous sheaths, up to c. 10.75 cm. long, c. .25 cm. diam. when dried, 1-leaved. Leaf narrowly linear-lanceolate, acute, thinly coriaceous, keeled beneath, up to c. 23 cm. long, c. .85 cm. wide, base rather abruptly narrowed to a grooved petiole c. 1.80 cm. long. *Inflorescence* from the apex of the almost mature pseudobulb, elongate, very slender, as long as the leaves or longer, peduncle filiform provided beneath the rachis with some appressed imbricating bract-like sheaths c. 16 cm. long c. .05 cm. diam., rachis thickened more or less 4-sided and concave alternately on each side above the flower c. 8 cm. long with internodes c. .20 cm. long. *Bracts* much longer than the pedicel and ovary, broadly triangular-ovate, obtuse, c. .27 cm. long, c. .32 cm. wide. *Dorsal sepal* oblong-lanceolate, narrowly obtuse, 3-nerved, c. .20 cm. long, c. .09 cm. wide. *Lateral sepals* oblong-ovate, obtuse, falcate, 3-nerved, keeled on the back towards the apex, c. .25 cm. long, c. .11 cm. wide. *Petals* oblong, acuminate, acute, 1-nerved, c. .22 cm. long, c. .05 cm. wide. *Lip* entire, concave with erect margins, triangular-ovate or obliquely subquadrate, obtuse, 3-nerved, provided inside in the lower ½ above the base with 3 rounded keels, the median keel short tuberculiform, the outer keels divaricate from the base almost rightangularly incurved and much dilate in the upper ½ with the apex nearly contiguous reaching a little beyond the middle of the lip, spread out c. .20 cm. long and as broad. *Column* entire, c. .10 cm. tall, rostellum suberect triangular, stigma semiorbicular.

The nearest affinities of this plant appear to be *D. fuscescens* Schltr. & J. J. S. and *D. lamellatum* J. J. S.

from Sumatra from both of which it differs in the much smaller flowers with a very different lip.

S. 513 (type), Dulit ridge c. 1400 m., September 17th, 1932, *P. M. Synge.* "Growing in moss on top of peak in moderate sun. Flowers pale brown, column slightly darker than petals. No scent."

S. 415, Dulit ridge c. 4000 feet altitude, September 6th, 1932, *P. M. Synge.* "Moss forest. Flowers small, greenish. Leaves medium green." In this plant the flowers are more or less appressed to the rachis.

Described from dried plants.

**Dendrochilum** (§ Platyclinis) **minimiflorum** sp. nov. Pseudobulbi ovoidei, 1-folii. Folium angustissime lineari-oblanceolatum, acutum, tenuiter coriaceum. Inflorescentia apicem versus multiflora. Bracteæ late ovatæ vel suborbiculares, obtusæ. Sepala oblongo-ovata, breviter abrupteque acuminata, acuta. Petala late ovata, obtusa. Labellum integrum, concavum, e basi cuneata late ovatum, apici incrassatum et apiculatum, intus super basin carina hippocrepidiformi basi bidenticulata donatum. Gynostemium breve, crassum, stelidiis stigma prope ortis brevibus triangularibus obtusis.

*Rhizome* creeping, branched. *Pseudobulbs* up to c. .50 cm. distant, ovoid, wrinkled, sometimes a little curved, c. .90 cm. long, c. .50 cm. diam. near the base, 1-leaved. *Leaf* very narrowly linear-oblanceolate, acute, thinly coriaceous, margins more or less revolute in the dried plant, 5.20-7.50 cm. long, c. .20 cm. wide, base narrowed gradually to a petiole .50-1.50 cm. long, the petiole very slender grooved. *Inflorescence* from the apex of the immature pseudobulb, much longer than the leaf, many-flowered, peduncle filiform provided beneath the rachis with an appressed bract-like sheath up to c. 8.50 cm. long, c. .05 cm. diam., rachis c. 5 cm. long with internodes c. .15 cm. long. *Bracts* longer than the pedicel and ovary, broadly ovate or suborbicular, obtuse, margins erose-crenate, c. .10 cm. long, c. .08 cm. wide. *Dorsal sepal* oblong-ovate, abruptly and shortly acuminate, acute, 3-nerved, c. .15 cm. long, c. .09 cm. wide. *Lateral sepals* oblong-ovate, very shortly acuminate, acute or obtuse, 1-nerved, c. .13 cm. long, c. .08 cm. wide. *Petals* broadly ovate, obtuse, falcate, 1-nerved, c. .13 cm. long, c. .08 cm. wide. *Lip* entire, concave, fleshy, broadly ovate from a cuneate base, very fleshy and acutely apiculate at the apex, provided inside above the base with a prominent horse-shoe apparently red keel with 2 minute teeth at the base, spread out c. .07 cm. long, c. .05 cm. wide. *Column* short, stout,

c. .04 cm. tall, stelidia rising from near the stigma short triangular obtuse.

This very interesting plant is characterized by the very small dimensions of the flowers and by the structure of lip and column. It is the smallest flowered species of the sub-genus known to me.

S. 476 (type), Dulit ridge c. 1300 m., September 13th, 1932, *P. W. Richards.* "Small tree in moss forest. Flowers small pale green with brown centre. Pseudobulbs wrinkled, chestnut brown. Slight scent."

S. 446, Dulit ridge c. 1230 m., September 7th 1932, *P. M. Synge.* "Moss forest. Flowers pale green, chestnut column. Pseudobulb chestnut. Slight sweet scent."

S. 548, Dulit ridge c. 1000 m., October 1st, 1932, *P. W. Richards.* "Flowers small, pale brown, darker brown tip to column. No scent. Stem brown. Pseudobulbs chestnut brown."

Described from dried plants.

**Claderia viridiflora** Hook. f. Fl. Brit. Ind. v (1890), 810; Ic. Pl. xxi (1892), t. 2083.

S. 16, Marudi near sea level, July 25th, 1932, *P. M. Synge.* "Flowers greenish."

*Distribution:*—Sumatra, Malay Peninsula.

**Dilochia gracilis** comb. nov. *Arundina gracilis* A. & S. Orch. vi (1920), 96.

S. 534, Dulit ridge c. 1350 m., September 20th 1932, *P. M. Synge.* "Growing in rather dry moss forest on top of subsidiary peak. Flower white with pale crimson markings outside. Column crimson at base. Labellum white inside, pale yellow near tip. Slight sweet scent. Stem crimson-brown."

Fruiting specimens found by me on Mount Kinabalu in British North Borneo have convinced me that this plant is a true *Dilochia.* It agrees also in habit.

*Distribution:*—Endemic.

**Oberonia ciliolata** Hook. f. Fl. Brit. Ind. vi (1890), 181; Ic. Pl: t. 2318.

S. 447, Dulit ridge c. 1240 m., September 7th, 1932, *native collector.* "Flowers pale orange-brown with orange centre."

*Distribution:*—Malay Peninsula.

***Oberonia insectifera** Hook. f. Ic. Pl. t. 2004.

S. 319, Dulit c. 300 m., August 23rd 1932, *P. M. Synge.* "Flowers brown, small. Leaves tinged pink at the base."

*Distribution:*—Malay Peninsula.

*__Microstylis Blumei__ Bœrl. & J. J. S. Ic. Bog. II, t. cviii. B.

S. 136, Dulit c. 500 m., August 8th, 1932, *P. M. Synge.* On a dead log in shade in rain forest. Flowers purple lake, column green. Stalk of flower purple lake."

S. 165, Dulit under 300 m., August 11th, 1932, *native collector.* "Flowers purple lake."

S. 359, Dulit under 300 m., August 30th 1932, *native collector.* "Epiphytic in primary forest. Flowers crimson lake. No scent."

*Distribution:*—Java.

__Microstylis commelinifolia__ Zoll. & Mor. in Nat. en Geneesk. Arch. Neerl. Ind. 1 (1844), 402.

S. 477, Dulit ridge c. 1300 m., September 13th, 1932, *P. M. Synge.* "Growing on limestone cliff facing South. Flowers small, pale greenish yelow, stem purplish. Leaves pale green."

*Distribution:*—Java.

__Microstylis Andersonii__ Ridl. in Kew Bull. 1914, 210.

S. 599, Niah under 300 m., November 1932, *P. M. Synge.* "Shade on damp limestone crags. Flower stalk purple. Petals purple, labellum and stigma yellow. The leaves have a pale green stripe in the centre bordered by broad purplish brown stripes."

*Distribution:*—Endemic.

__Microstylis latifolia__ J. J. S. in Fl. Buit. vi (1905), 248; Atlas f. clxxxc: *M. congesta* Rchb. f. in Walp. Ann. vi (1861), 206.

S. 46, Marudi near sea level, July 27th, 1932, *P. M. Synge.* "Flowers brownish in colour."

*Distribution:*—Sumatra, Java, Malay Peninsula, Celebes, N. Guinea, Australia, Philippines, Cochin China, China, India and Ceylon.

__Liparis parviflora__ Lndl. Gen. & Sp. Orch. (1830), 31.

S. 238, Dulit under 300 m., August 18th, 1932, *P. M. Synge.* "Labellum pink, petals white. Scentless."

*Distribution:*—Sumatra, Java, Malay Peninsula, Philippines, Celebes, Siam.

__Liparis confusa__ J. J. S. Fl. Buit. vi Orch. (1905), 275, Atlas n. ccxi.

S. 578, Niah under 300 m., November 1932, *P. M. Synge,* "Petals greenish yellow, labellum red. No scent."

*Distribution:*—Java, ? Sumatra.

__Liparis longissima__ J. J. S. in Bull. Jard. Bot. Buit. Ser. 2. xiii (1914), 6; l.c. II. Suppl. t. 25, f. vi.

S. 234, Dulit under 300 m., August 17th, 1932, *P. M. Synge.* "Small tree trunk c. 3 feet from the ground,

moderately common. Flowers white, small. Lip touched with pale pink. No smell."

*Distribution:*—Endemic.

***Liparis purpureo-viridis** Burk. & Holt. in Gard. Bull. Str. Settle. iii (1923), 77.

S. 532, Dulit ridge c. 1350 m., September 19th, 1932, *P. W. Richards.* "Moss forest. Growing among moss near bottom of small rocky face, shady and damp. Labellum green with prominent purplish veins. Two lateral filaments recurved downwards, purple. Stem purple. Leaf glistening purple, bluish green beneath." A sketch in colour shows the sepals green, the petals purple and the lip green with purple nerves and fimbriæ.

*Distribution:*—Malay Peninsula.

**Agrostophyllum majus** Hook. f. Fl. Brit. Ind. v (1890), 824; Ic. Pl. xxi (1892), t. 2096.

S. 591, Niah under 300 m., November 1932, *P. M. Synge.* "Flowers small, white. Slight sweet scent."

*Distribution:*—Sumatra, Malay Peninsula.

***Agrostophyllum confusum** J. J. S. in Bull. Jard. Bot. Buit. Ser. 3. II (1920), 38; II. Suppl. (1930), t. 31, f. 1.

S. 81, Dulit c. 1800 feet above camp, August 4th, 1932, *native collector.* "Flowers white."

*Distribution:*—Sumatra, Malay Peninsula.

**Agrostophyllum bicuspidatum** J. J. S. in Ic. Bog. II. (1903), 55.

S. 176, Dulit under 300 m., August 12th 1932, *native collector.* "Flowers white, scentless."

*Distribution:*—Java, Sumatra, Malay Peninsula.

**Ceratostylis alata** sp. nov. Caules approximati, 3-nodii, 1-folii. Folium anguste lineari-oblanceolatum, breviter inæqualiter bilobum. Inflorescentiæ apicales, fasciculatæ, breves, unifloræ. Sepala extus longe pilosa. Sepalum dorsale oblongum, obtusum. Sepala lateralia e basi falcata oblongo-oblanceolata, obtusa. Petala elliptico-lanceolata, acuminata, acuta. Labellum e basi angusta late spathulatum, crasse conico-apiculatum apiculo piloso, intus in 2/3 partibus inferioribus bicarinatum. Gynostemium breve, lateribus alte alatum.

*Stems* approximate, terete, internodes 3, c. 2.80 cm. long, 1-leaved. *Leaf* very narrowly linear-oblanceolate, shortly unequally bilobed or oblique, coriaceous, c. 9 cm. long, c. .30 cm. wide, petiole grooved up to c. 1.30 cm. long. *Inflorescences* from the apex of the stem, fascicled, 1-flowered, peduncle densely white-hairy c. .80 cm. long.

*Bract* minute, ovate, acute. *Sepals* long-hairy outside. *Dorsal sepal* oblong, obtuse, 3-nerved, c. .35 cm. long, c. .15 cm. wide. *Lateral sepals* falcate at the base, oblong-oblanceolate, obtuse, anterior margin shortly roundly dilate at the base, 3-5-nerved, c. .47 cm. long, c. .18 cm. wide. *Petals* elliptic-lanceolate, acuminate, acute, 1-nerved, c. .38 cm. long, c. .10 cm. wide. *Lip* shortly and broadly spathulate from the narrow base, apex fleshy conic-apiculate hairy, remainder glabrous, sides suberect, provided inside in the lower 2/3 with 2 parallel glabrous keels which are dilate just below the apex and terminate rather abruptly, spread out c. .35 cm. long, c. .25 cm. wide. *Column* c. .17 cm. tall, sides very strongly winged. *Anther* cordate, acuminate, acute, keeled, c. .10 cm. long. *Column foot* forming a right angle with the column, c. .12 cm. long, *Ovary* and *pedicel* densely covered with long white hairs, c. .37 cm. long.

This plant is an ally of *C. lancifolia* Hook. f., from which it differs in the shorter stems, longer narrower leaves, smaller flowers and very different lip.

S. 137, Dulit c. 500 m., August 8th, 1932, *native collector*. "Flowers small, white, red edge to petals."

Described from dried plants.

**Podochilus lucescens** Bl. Bijdr. (1825), 295; Tab. f. 12.

S. 583, Niah under 300m., November 1932, *P. M. Synge*. "Tree trunks in swampy ground near limestone caves in shade. Flowers small, white, tubular."

*Distribution:*—Java, Sumatra, Malay Peninsula, Anamba Is; Tenasserim, Siam.

**Podochilus sciuroides** Rchb. f. in Bonpl. v (1857), 41.

S. 74, Dulit c. 400 feet above camp, August 3rd, 1932, *P. W. Richards*. "Clinging to bare surface of large sandstone boulder by torrent, moderate sun. Flowers white with a purple spot inside."

S. 485, Dulit ridge c. 1100 m., September 14th, 1932, *P. M. Synge*. "Growing on rocks near base of waterfall at lower level of moss forest. Flowers white, purple spots on petals."

*Distribution:*—Sumatra, Malay Peninsula.

**Appendicula anceps** Bl. Bijdr. (1825), 299.

S. 101, Dulit under 300 m., August 6th, 1932, *P. M. Synge*. "Flowers white, column purple."

*Distribution:*—Sumatra, Java, Malay Peninsula, Celebes, Natuna Is., Philippines.

**Appendicula reflexa** Bl. Bijdr. (1825), 301.

S. 164, Dulit under 300 m., August 10th 1932, *native collector*. "Flowers whitish green."

*Distribution:*—Sumatra, Java, Malay Peninsula, Bali, Celebes, Moluccas, N. Guinea.

**Appendicula pendula** Bl. Bijdr. (1825), 298.

2286, Dulit under 300 m., October 19th, 1932, *native collector.* "Epiphyte on tree by torrent. Ovary purplish, rest of flower greenish yellow."

S. 69, Dulit c. 250 feet alt., August 3rd, 1932, *P. M. Synge.* "Growing on trunk of tree fern overhanging stream. Sepals pale green, pasterior petal white. Stigma brown."

*Distribution:*—Sumatra, Java, Malay Peninsula, Natuna Is.

**Appendicula** (§ Chaunodesme) **niahensis** sp. nov. Caules approximati, elongati. Folia ovato-elliptica, apici brevissime conduplicata subæqualiter et obtuse biloba, basi torta, vagina tubulosa. Inflorescentiæ apicales vel e nodis supremis, breves, dense paucifloræ. Bracteæ reflexæ, oblongo-obovatæ, obtusæ. Sepala lateralia triangulari-ovata, obtusa, margine antico basi in lobum anguste oblongum producto. Petala oblongo-obovata, obtusissima. Labellum panduratum, subacutum, intus basin versus callo subquadrato antice in carinas 2 breves producto dimidio superiore carina basi carnosa superne angusta donatum, apice incurvo minute apiculato.

*Stems* approximate, erect, up to c. 45 cm. tall, internodes c. .80 cm. long. Leaves ovate-elliptic, apex very shortly conduplicate nearly equally obtusely very shortly bilobed, base twisted, up to c. 3.35 cm. long, c. 1.35 cm. wide, upper ones smaller, sheaths tubular with funnel-shaped apex. *Inflorescences* apical and from the uppermost nodes, short, stout, densely few-flowered, peduncle c. .50 cm. long with some short tubular imbricating sheaths at the base, rachis c. 1.10 cm. long, c. 12-flowered. *Bracts* strongly reflexed from the base with the apex incurved, oblong-obovate, obtuse, 5-nerved, keeled and densely furfuraceous outside, c. .47 cm. long, c. .28 cm. wide. *Dorsal sepal* ..... *Lateral sepals* triangular-ovate, obtuse, 3-nerved, anterior margin produced at the base to a narrowly oblong lobe forming a mentum c. .35 cm. long, c. .43 cm. long, c. .33 cm. wide. *Petals* oblong-obovate, very obtuse, 3-nerved, c. .30 cm. long, c. .20 cm. wide. *Lip* pandurate, subacute, the lower ½ (claw) broadly elliptic, the upper ½ (blade) ovate, margins shortly adnate at the base to the column foot, concave, claw provided with a subquadrate callus produced in front to 2 short keels which diverge to the margins at the base of the blade; blade

strongly recurved above the base, provided above the base with a fleshy median keel which is sharply attenuate towards the apex, the margins above the bend incurved, apex incurved minutely apiculate, the whole spread out c. .47 cm. long c. .23 cm. wide. *Column* c. .30 cm. tall, rostellum bifid, foot c. .30 cm. long, the margins shortly adnate at the base to the lip.

This is allied to *A. latibracteata* J. J. S. and is distinguished by the smaller leaves, very short dense inflorescence and different flowers.

S. 601, Niah under 300 m., November 1932, *P. M. Synge.* Tree branch among limestone crags near top of small hill. Flowers white, no scent. Leaves slightly fleshy."

Described from a dried plant.

**Appendicula longicalcarata** Schltr. Orchideen (1914), 291; *Podochilus longicalcaratus* Rolfe in Kew Bull. (1894), 186.

S. 598, Niah under 300 m., November 1932, *P. M. Synge.* "Growing on *Aeschynanthus* root on tree in moderate shade among limestone crags. Flower white with mauve edge to labellum, white spur. Leaves purplish beneath."

*Distribution:*—Endemic.

**Plocoglottis acuminata** Bl. Mus. I (1849), 46.

1035, Dulit under 300 m., July 31st 1932, *P. W. Richards.* "Petals pale yellow, all except labellum with deep orange-red spots."

S. 66, Dulit, August 2nd 1932, *native collector.* "Petals orange with red spots. Hood (? lip) pale yellow."

S. 141, Dulit under 300 m., August 9th, 1932, *native collector.* "Flowers yellow with red spots on petals. Labellum yellow. The column forms a small hood, red, yellow inside."

*Distribution:*—Sumatra, Java, Malay Peninsula.

**Plocoglottis Lowii** Rchb. f. in Gard. Chron. 1865, 434: *P. porphyrophylla* Ridl. in Trans. Linn. Soc. Ser. 2. Bot. III (1893), 368.

2682, Marudi forest reserve under 300 m., November 1932, *P. W. Richards.* "Locally abundant. Flowers yellow marked with dull crimson. Leaves reddish purple beneath."

*Distribution:*—Sumatra, Malay Peninsula.

**Calanthe veratrifolia** R. Br. in Bot. Reg. ix (1823), t. 270.

577, Niah under 300 m., November 1932, *P. M. Synge.* "Limestone rocks on ledge at end of cave. Petals white, tip of column bright yellow."

*Distribtuion:*—Java, Sumatra, Malay Peninsula, Celebes, Moluccas, Anamba Is., Philippines, India, Australia.

**Calanthe pulchra** Lndl. Gen. & Sp. Orch. (1833), 250: *C. curculigoides* Lndl. l.c. 251.

2466, Dulit trail c. 750 m., November 6th, 1932, *P. W. Richards.* "Perianth apricot coloured except the wings of the labellum which are scarlet."

*Distribution:*—Java, Sumatra, Malay Peninsula, Philippines.

**Spathoglottis Kimballiana** Hook. f. in Bot. Mag. iii, 51 (1895), t. 7443.

S. 464, Dulit ridge c. 1200 m., September 12th, 1932, *P. M. Synge.* "Growing in small cleft in rock by edge of waterfall in moss forest. Flowers bright yellow, stem deep crimson, crimson markings on labellum. No scent."

*Distribution:*—Philippines (var. angustifolia Ames).

**Eria Aeridostachya** Rchb. f. Lndl. in Journ. Linn. Soc. III, 48.

S. 99, Dulit c. 2000 feet above camp, 4th August, 1932, *native collector.* "Flowers greenish, labellum greenish yellow. Tip of column pink."

S. 474, Dulit ridge c. 1300 m., 13th September, 1932, *P. M. Synge.* "Leaves blue-green, stiff. Flowers pale green with brown tip to column. Sheath at base of flower stem rich chestnut brown. Slight sweet scent."

*Distribution:*—Malay Peninsula.

**Eria** (§ Aeridostachya) **dulitensis** sp. nov.

Rhizoma validum. Caules ad c. 7 cm. dissiti, breves, 2-3-folii. Folia oblanceolata, oblique acuta, crasse carnosa, basi breviter petiolata. Inflorescentiæ 1-2 e nodis superioribus, rachide nutante stellato-pubescente, densiuscule multifloræ. Bracteæ triangulari-ovatæ, acutæ, extus stellato-pubescentes. Sepala 3-nervia, extus densiuscule stellato-pubescentia. Sepalum dorsale ovatum, obtusum. Sepala lateralia falcata, ovata, obtusa, margine antico in mentum oblongum clavatum producto. Petala falcata, oblonga, obtusa, margine antico basi breviter producto, glabra. Labellum e basi breviter unguiculata elliptica, apicem versus inconspicue 3-lobum lobis brevissimis rotundatis, marginibus superne undulatis. Pes gynostemii oblongus, apicem versus leviter angustatus, medio fere carina V-formiter donatus.

*Rhizome* stout, elongate, covered with the remains of old fleshy sheaths, c. .85 cm. diam., internodes c. 1.50 cm. long. *Stems* up to c. 7 cm. distant, forming an acute angle with the rhizome, 3-4-noded, covered at first with fleshy imbricating broadly ovate or suborbicular obtuse sheaths,

cylindric, much wrinkled when dry, c. 4 cm. long, 2-3-leaved with a large articulate sheath c. 5.50 cm. long beneath the leaves. *Leaves* oblanceolate, obliquely acute, thickly fleshy, grooved above, keeled beneath, margins more or less revolute when dry, base gradually narrowed, c. 18.50 cm. long c. 2.10 cm. wide, petiole grooved c. 1 cm. long. *Inflorescences* 1-2 from the upper nodes, rather densely many-flowered, peduncle terete glabrous provided at the base with 2 very small tubular sheaths and some minute ovate bract-like appressed sheaths at intervals above c. 9.50 cm. long, rachis arched stellate-hairy c. 13 cm. long. *Bracts* triangular-ovate, acute, stellate-pubescent outside, fleshy, c. .18 cm. long, c. .14 cm. wide. *Sepals* rather densely stellate-hairy outside. *Dorsal sepal* ovate, obtuse, 3-nerved, c. .40 cm. long, c. .27 cm. wide. *Lateral sepals* falcate ovate, obtuse, 3-5-nerved, anterior margin produced at the base to form an oblong clubbed mentum c. .45 cm. long which lies at right angles with the ovary, c. .33 cm. long, c. .33 cm. wide. *Petals* falcate, oblong, obtuse, 3-nerved, anterior margin a little produced at the base, c. .35 cm. long, c. .17 cm. wide. *Lip* shortly clawed at the base, blade elliptic inconspicuously 3-lobed towards the apex with the lobes minute rounded, margins undulate, 3-nerved with the outer nerves branched, papillose except at the base, base apparently red remainder yellow or green, spread out c. .67 cm. long, c. .30 cm. wide. *Column* crimson, c. .17 cm. tall, dilate towards the apex, foot oblong narrowed towards the apex recurved above the middle provided about the middle with a crimson V-shaped keel c. .58 cm. long. *Ovary* and pedicel densely stellate-hairy, c. .65 cm. long.

This is a near ally of *E. reptans* Ridl. from the Malay Peninsula but it differs in the more distant stems, presence of more than one leaf and in the lip which is very much larger and more acute. The lip in *E. reptans* Ridl. is also 3-lobed but the lobing is more distinct and the midlobe very obtuse, the lip being comparatively broader and more or less obovate in outline.

S. 463, Dulit ridge c. 1230 m., 10th September, 1932, *P. M. Synge*. "Flowers pale cream, tip of column brown. Leaves dark blue-green, stem and pseudobulbs covered with pale brown sheath."

Described from dried plants and flowers preserved in spirit.

**Eria** (§ Cymboglossum) **cymbidifolia** Ridl. in Journ. Bot. xxxvi (1898), 212.

S. 154, Dulit c. 300 m., 9th August, 1932, *native collector*. "Flowers white, crimson at base of column and on tip. Smell slightly sweet."

*Distribution:*—Sumatra.

**Eria cymbidifolia** Ridl. *var.* **longipes** var. nov.

This variety differs from the typical plants only, so far as I can see, in the elongate stems which may be found up to 22 cm. long. In all other respects, even to the keels on the lip, the plants are identical so that although the variety is so very distinct in habit I do not feel justified in considering it as a distinct species. I have found both forms together on Mount Kinabalu in British North Borneo.

S. 368, Dulit ridge c. 4000 feet alt., 30th August, 1932, *E. Shackleton.* "Moss forest. Flowers cream, red markings on lateral petals, on column and on inside surface of labellum. No scent."

S. 416 (type), Dulit ridge c. 4300 feet alt., 6th September, 1932, *P. M. Synge.* "Small tree in moss forest. Flowers white with crimson labellum, column and side petals, red spots on stalk beneath. Slight bitter scent."

**Eria longifolia** Hook. f. Fl. Brit. Ind. v (1890), 790; Ic. Pl. xxi (1892), t. 2068. etc.

S. 515, Dulit ridge c. 950 m., 17th September, 1932, *C. H. Hartley.* "Sand forest. Flowers white, slight sweet scent."

*Distribution:*—Sumatra, Malay Peninsula.

***Eria punctata** J. J. S. in Bull. Dep. Agr. Ind. Neerl. xiii (1907), 38; in Bull. Jard. Bot. Buit. Sér. 3, VI (1924), t. 3, F. IV.

2479, Ulu Koyan, Dulit c. 1000 m., 7th November, 1932, *P. W. Richards* " 'Transition' forest among moss at base of tree. Perianth dirty white with crimson spots."

*Distribution:*—Java, Sumatra, Malay Peninsula.

**Eria nutans** Lndl. in Bot. Reg. XXVI (1840), Misc. 83. etc.

S. 510, Ulu Koyan c. 900 m., 16th September, 1932, *native collector.* "Growing on small tree in sand forest. Flowers white, yellow at tip of labellum, pale yellow on outside of lateral petals, brownish orange at base of column."

*Distribution:*—Sumatra, Malay Peninsula, Natuna Is.

**Trichotosia aurea** comb. nov. *Eria aurea* Ridl. in Journ. Roy. As. Soc. Str. Br. XLIX (1908), 31: *E. rhombilabris* J. J. S. in Bull. Inst. Bot. Hamb. VII (1927) 50, t. 8, f. 40.

S. 498, Ulu Koyan c. 850 m., 16th September, 1932, *native collector.* "Small tree trunk in sand forest near ground. Flowers small, pale green petals brown tip to column. No scent."

I cannot distinguish *E. rhombilabris* J. J. S.

*Distribution:*—Endemic.

***Trichotosia aporina** Krzl. in Pflanzenr. IV. 50. II. B. 21 II (1911), 150: *Eria aporina* Hook. f. Fl. Brit. Ind. V, 308; Ic. Pl. XXI (1892), t. 2081.

S. 387, Dulit under 300 m., 2nd September, 1932, *P. M. Synge.* "Flowers green."

*Distribution:*—Malay Peninsula.

**Trichotosia sarawakensis** sp. nov.

Caules approximati, elongati. Folia lanceolata, sub apice oblique acuminata, pungentia, pilis brevissimis bipartitis obsessa, vagina apicem versus laxe basin versus dense pilis bipartitis obsessa pilis apicem versus minutis basi dilatatis basin versus elongatis gracilibus vaginæ subparallelis. Inflorescentiæ laxe pauciforæ, pilis longis bipartitis dense obsessæ. Bracteæ ovatæ, brevissime acuminatæ, acutæ, extus pilosæ, pilis bipartitis. Sepala extus pilosa pilis bipartitis summi sepali subparallelis. Sepalum dorsale oblongo-lanceolatum, obtusum. Sepala lateralia ovata, breviter acuminata, obtusa, margine antico basi producta mentum oblongum obtusum formante. Petala spathulata, subacuta, extus pilis bipartitis sparse obsessa. Labellum unguiculatum, 3-lobum, ungui lineari marginibus ciliatis, intus tricarinatum carina brevi ungui lobi intermedii utrinque addita, lobis lateralibus falcatis rotundate triangularibus obtusis marginibus eroso-serratis vel minute lacinulatis, lobo intermedio basi unguiculato lamina transverse reniformi lobis apicalibus rotundatis dente minuto in sinu marginibus eos loborum lateralium simulantibus.

*Stems* approximate, stout, leafy from above the base, c. 46 cm. long, c. .65 cm. wide at the base internodes up to c. 5 cm. long the upper ones shorter. *Leaves* lanceolate or linear-lanceolate, shortly obliquely acuminate, apex caudate acute, laxly and shortly hairy with the hairs bipartite, rather fleshy and coriaceous, up to c. 11.75 cm. long, .90-2.15 cm. wide, base twisted, sheath tubular ribbed laxly shortly hairy towards the apex densely hairy towards the base with the hairs bipartite and subparallel to the surface dark red. *Inflorescences* laxly few-flowered densely covered with long bipartite dark red hairs, peduncle provided at the base with an ovate acute hairy sheath up to c. 1.50 cm. long, rachis c. 7 cm. long sinuous. Bracts ovate, very shortly acuminate, acute, 9-nerved, densely hairy outside, hairs bipartite, c. .95 cm. long, c. .80 cm. wide. *Sepals* hairy outside with the hairs bipartite and more or less parallel to the surface. *Dorsal sepal* oblong-lanceolate, obtuse, 5-nerved, c. 1.13 cm. long, c. .33 cm. wide.

*Lateral sepals* falcate, ovate, shortly acuminate, obtuse, 5-nerved, c. .85 cm. long, c. .50 cm. wide, the anterior margin produced at the base to form an oblong obtuse mentum c. .63 cm. long. *Petals* spathulate, subacute, 3-nerved sparsely hairy outside, hairs bipartite, c. .80 cm. long, c. .28 cm. wide. *Lip* clawed to below the middle, 3-lobed, provided inside with 3 warty and papillose keels which run from above the apex of the claw to the sinus of the apical lobules of the midlobe, the outer 2 branched towards the apex, an extra short similar keel on each side on the claw of the midlobe, spread out c. 1.37 cm. long, c. .65 cm. wide across the side lobes; claw linear, a little dilate towards the apex, concave, provided along the middle in the upper ½ with a few warts, papillose along the nerves, margins ciliate, c. .58 cm. long; side lobes falcate, roundly triangular, obtuse, margins irregularly erose-serrate or erose-lacinulate; midlobe cuneately clawed, blade reniform, the apical lobules rounded with a minute tooth in the sinus, margins as in the side lobes, in all c. .47 cm. long, c. .55 cm. wide, claw c. .10 cm. long c. .30 cm. wide. *Column* c. .40 cm. tall, stigma occupying nearly the whole face transversely elliptic, foot linear, apex abruptly dilate and thickened c. .80 cm. long. *Ovary* densely hairy, the hairs bipartite, c. .50 cm. long.

This is a near ally of *T. unguiculata* (J. J. S.) Krzl. also a Bornean plant. It is distinguished, however, by the larger flowers and especially by the structure of the lip.

Another near allly is **T. lacinulata** (*Eria lacinulata* J. J. S.) Carr also from Borneo but it differs from this in the hairiness, the hairs in *T. sarawakensis* Carr being always bipartite and more or less appressed and much reduced on the upper part of the sheaths, the longer claw of the lip, the narrower midlobe with a long clawed base and the keels which are not hirtellous nor muricate. There are moreover 2 extra keels on the base of the midlobe in *T. sarawakensis* Carr.

S. 402, Dulit ridge, c. 4000 feet alt., 5th September, 1932, *P. M. Synge.* "Moss forest, epiphytic. Petals pale greenish brown. Labellum cream with dull pink centre and 2 side ridges. Prominent green bracts. Flower stems bear pink hairs."

Described from dried plants and flowers preserved in spirit.

***Dendrobium ustulatum** Carr. in Gard. Bull. Str. Settle., VII, 1932) 13.

S. 188, Dulit under 300 m., 13th August, 1932, *P. W. Richards.* "Flowers whitish veined red. No scent."

*Distribution:*—Malay Peninsula.

**Dendrobium carnosum** Rchb. f. in Walp. Ann. VI (1861), 280. etc.

S. 602, Niah under 300 m., November, 1932, *P. M. Synge.* "Small tree on summit of limestone crag exposed to a fair amount of sun, leaves fleshy. Flowers deep crimson."

*Distribution:*—Sumatra, Java, Malay Peninsula.

**Dendrobium babiense** J. J. S. in Engl. Bot. Jahrb. XLVIII (1912), 98.

S. 519, Dulit ridge c. 950 m., 16th September, 1932, *native collector.* "Petals pale yellow, labellum deeper yellow. Column white, base deep crimson, tip pale brown. No scent."

*Distribution:*—Endemic.

**Dendrobium rosellum** Ridl. in Journ. Linn. Soc. Bot. XXXI (1896), 268.

S. 3, Marudi near sea level, 25th July, 1932, *P. M. Synge.* "Flowers magenta. Greenish anthers and pollinia. Scentless."

*Distribution:*—Malay Peninsula.

**Dendrobium** (§ Rhopalanthe) **cinnabarinum** Rchb. f. in Gard. Chron. II. 14 (1880), 166.

S. 518, Dulit ridge c. 1900 m., 17th September, 1932, C. H. Hartley. "Lower level of moss forest, epiphytic. Flowers deep pink, petals spotted deep crimson near base. Labellum pale orange with very deep crimson frilled tip. Ridge near base of labellum bright orange. Column white. No scent."

*D. cinnabarinum* Rchb. f. appears to show a wide range of variation both in dimensions and the colouring of the flowers. Normally the sepals are oblong-obovate but in S. 518 the lateral sepals are distinctly clawed with the blade broadly elliptic and measure 4.10×2.40 cm. The petals in S. 518, which is an unusually large-flowered example, are shortly clawed with the blade greatly dilate and suborbicular in outline and measure 3.55×2.50 cm. The lip varies considerably in all plants I have examined. It has the margins shortly adnate at the base to the column foot and there are 3 keels which do not always rise at the base and which reach to the base of the midlobe while there are often 1-2 extra short keels on each side at the base of the lip; it is usually glabrous but in S. 518 it is minutely papillose near the base; the midlobe varies considerably in the length of the triangular claw, the blade being lanceolate to oblong or elliptic with the margins more or less undulate and sometimes very strongly so and there is often an elevate median line. The column arms are falcately recurved, triangular,

caudate and are often provided about the middle with 1-2 minute teeth. The column foot is sometimes keeled inside and sometimes bears a conic tubercle below the apex.

*Distribution:*—Endemic.

Var. **angustitepalum** n. var. *Dendrobium sanguineum* Rolfe in Gard. Chron. (1895) II, 292.

S. 481, Ulu Koyan c. 1100 m., 15th September, 1932, *P. W. Richards.* "Petals crimson scarlet, pale lilac at base. Lip deep crimson with white frilled edge. Tip of column yellow."

Dr. F. Kränzlin, in Pflanzenreich IV, 50, II, B. 21, 237 reduces *D. sanguineum* Rolfe to *D. cinnabarinum* Rchb. f. While agreeing that the two plants cannot be kept separate as distinct species there are at the same time such marked differences as to render it advantageous to regard the present plant as a distinct variety based upon the very narrow sepals and petals. In the type of *D. sanguineum* Rolfe the sepals are narrowly oblong-oblanceolate, the dorsal 2.25×.53 cm., the laterals 2.38×.55 cm. The petals are spathulate and measure 2.20×.90 cm. The midlobe of the lip is narrower than in the typical *D. cinnabarinum* and the margins are closely and densely undulate.

In S. 481 the dorsal sepal measures 2.35×.45 cm, the laterals 2.70×.55 cm. and the petals which are oblanceolate above the clawed base measure 2.28×.47 cm. The lip measures when spread out 2.20×.68 cm. across the side lobes and the midlobe is long and tapering to an acute apex and measures 1.40×.28 cm. at the base. There is no callus near the apex of the column foot.

Var. **lamelliferum** n. var.

S. 473, Dulit ridge c. 1300 m., 13th September, 1932, *P. M. Synge.* "Growing in moss forest as epiphyte in moderately open spots. Flowers brilliant scarlet."

This variety differs from the type by the lower half of the blade of the lip bearing a dense cover of long ciliate lamellæ the lamellæ being broad and much branched, narrow and few-branched or single and hair-like. The keels of the lip end in similar though much shorter lamellæ and there are 2 very short similar keels on each side at the base. Above the keels there is a thickened median bar which runs to the apex of the lip and includes the 3 inner nerves which are minutely warty. There is a subglobose warty tubercle below the apex of the column foot.

**Dendrobium** (§ Rhopalanthe) **ventripes** sp. nov.

Caules approximati, basi cylindrici, super basin internodiis 2-3 in pseudobulbum anguste fusiformem dilatatis,

superne complanati sectioni transversa anguste elliptici usque ad apicem foliosi. Folia lanceolata vel oblongo-lanceolata, sub apice abrupte angustata, inæqualiter et obtuse biloba. Inflorescentiæ e nodis supremis caulium inter folios, brevissimæ, unifloræ, basi squamis siccis cinctæ. Sepalum dorsale ovatum, subacutum. Sepala lateralia subfalcata, ovata, obtusa, margine antico basi in mentum oblongum obtusum producto. Petala e basi breviter unguiculata lanceolata, obtusa. Labellum 3-lobum, basi concavum, lobis lateralibus tortis oblongis obtusis apice denticulatis, lobo intermedio crasse carnoso quadrilateraliter cylindrico. Gynostemium brevi, rectum, pede apicem versus rotundatim dilatato et valde concavo tubercula minuta sub apice.

*Stems* approximate, base cylindric, 2-3 internodes above the base thickened into a narrowly fusiform many-grooved pseudobulb constricted at the nodes and up to c. 9.50 cm. long, above the pseudobulb much flattened and narrowly elliptic in section, up to c. 62 cm. long, leafy to the apex, internodes dilate upwards with the lowest largest c. 3.33 cm. long c. .45 cm. wide uppermost c. .50 cm. long. *Leaves* lanceolate or oblong-lanceolate, abruptly narrowed below the apex, shortly unequally obtusely bilobed, thinly coriaceous, grooved above, keeled beneath, base twisted, lower leaves largest c. 3.70 cm. long .50-.93 cm. wide, apical leaves c. 1.10 cm. long, sheaths tubular winged. *Inflorescences* from tufts of dry scales at the highest nodes among the leaves, very short, 1-flowered. *Sepals* and *petals* rather fleshy. *Dorsal sepal* ovate, subacute 5-nerved, c. .57 cm. long, c. .40 cm. wide. *Lateral sepals* subfalcate, ovate, obtuse, 7-nerved, c. .55 cm. long, about as broad, dilate at the base to form an oblong obtuse mentum c. .40 cm. long. *Petals* lanceolate above the shortly clawed base, obtuse, 3-nerved, c. .45 cm. long, c. .15 cm. wide. *Lip* 3-lobed, base concave, spread out c. 1.30 cm. long, c. .50 cm. wide across the side lobes; side lobes twisted, erect, much exceeding the midlobe, oblong, apex incurved obtuse and denticulate, towards the apex shortly hairy with the margins ciliate, c. .35 cm. long, c. .15 cm. wide; midlobe thickly fleshy, quadrilaterally cylindric, dilate towards base and apex, in the upper ½ recurved abruptly triangularly acuminate keeled with a short tubercular keel on each side below the apex, c. .18 cm. long. *Column* straight, c. .15 cm. tall, arms triangular blunt; foot oblong, roundly spathulately dilate in the upper ½ and ventricose with a minute tubercle in the middle of the depression, c. .67 cm. long.

A rather distinct species characterized by the stems being leafy to the apex, the curious lip structure and the ventricose column foot.

S. 422 (type), Dulit ridge c. 4000 feet alt., 6th September, 1932, *P. M. Synge*. "Moss forest. Flowers green with crimson markings on petals and labellum, borne on underneath of stems hidden by leaves from above. No scent."

S. 461, Dulit ridge c. 1240 m., 10th September, 1932, *P. M. Synge*. "Moss forest. Flowers pale greenish yellow with brown markings on petals and column."

Described from dried plants.

**Dendrobium** (§ Rhopalanthe) **gynoglottis** sp. nov.

Caules approximati, super basin internodiis 2-3 in pseudobulbum lanceolatum tenuem nodiis leviter constrictum valde dilatati, superne complanati foliosi, apicem versus leviter flexuosi interdum efoliosi. Folia anguste lanceolata, brevissime inæqualiter obtuse biloba vel obliqua, textura tenuiuscula. Inflorescentiæ e nodiis superioribus, brevissimæ, unifloræ. Sepalum dorsale ovato-ellipticum, obtusum. Sepala lateralia ovata, obtusa, basi in mentum oblongum acuminatum anguste obtusum dilatata. Petala e basi angusta obovata, obtusissima. Labellum longe unguiculatum, superne 3-lobum, ungui marginibus pedi gynostemii adnatis papilloso, lamina oblonga basin versus pilosa tricarinata lobis lateralibus brevibus subulatis, lobo intermedio subquadrato apici obtuso vel inconspicu bilobulo. Pes gynostemii sub apice tuberculam transversam semiovalem donatus.

*Stems* approximate, base cylindric rather flattened, 2-3 internodes above much dilated into a lanceolate flattened and thin pseudobulb a little constricted at the nodes and up to c. 8.50 cm. long c. 1.70 cm. wide, flattened above and narrowly elliptic in section, leafy, a little flexuous and sometimes leafless towards the apex, c. 57 cm. long, internodes up to c. 3.70 cm. long c. .35 cm. wide. *Leaves* narrowly lanceolate, very shortly unequally obtusely bilobed or oblique, rather thin in texture, up to c. 8.60 cm. long, c. 1.10 cm. wide, sheaths tubular. *Inflorescences* from tufts of dry scales at the upper nodes, fascicled, very short, 1-flowered. *Dorsal sepal* ovate-elliptic, obtuse, 3-nerved, c. .70 cm. long, c. .40 cm. wide. *Lateral sepals* ovate, obtuse 5-nerved, c. 1 cm. long, c. .65 cm. wide, base dilate to an oblong acuminate narrowly obtuse mentum c. .95 cm. long. *Petals* obovate from the narrow base, very obtuse, 3-nerved with the outer nerves branched above the base, c. .65 cm. long, c. .27 cm. wide. *Lip* clawed, 3-lobed, the blade oblong

hairy at the base and provided with 3 keels which terminate abruptly about the middle of the midlobe, spread out c. 1.90 cm. long, c. .80 cm. wide across the side lobes; claw linear, cuneately dilate towards the apex, margins adnate to the column foot forming a spur, papillose inside, c. .80 cm. long; side lobes arising from c. ¼ below the apex of the lip, subulate, free part c. .15 cm. long; midlobe subquadrate, obtuse or inconspicuously bilobed, c. .45 cm. long and as broad. *Column* c. .25 cm. tall, arms falcate triangular acute toothed, foot linear with a small transverse semioval tubercle below the apex c. 1.15 cm. long.

This is an ally of *D. incurvociliatum* J. J. S. from Central East Borneo but the flowers differ materially. In the present plant the claw of the lip is adnate to the column for a much greater distance and the midlobe is quite different.

S. 505, Ulu Koyan c. 900 m., 16th September, 1932, *native collector*. "Flowers white, crimson markings on outside of petals, pale orange at the base of spur; pale orange ridges on labellum. No scent. Leaves purplish green."

Described from a dried plant.

**Dendrobium lamelluliferum** J. J. S. in Bull. Inst. Allg. Bot. Hamb. VII (1927), 53, t. 8, f. 43.

S. 444, Dulit ridge c. 1230 m., 6th September, 1932, *P. M. Synge*. "Flowers creamy yellow, bright yellow tip to column. Stem brown. Pseudobulbs chestnut brown, ribbed."

This plant differs from that described by J. J. Smith in the narrower leaves and the glabrous lip.

*Distribution:*—Endemic.

**Dendrobium sculptum** Rchb. f. in Bot. Zeit. XXI (1863), 128; Xen. Orch. II (1868), 131, t. 146.

S. 421, Dulit ridge c. 4000 feet alt., 6th September, 1932, *P. W. Richards* and *P. M. Synge*. "Epiphytic in moss forest. Flowers white, orange at base of labellum. No scent."

*Distribution:*—Endemic.

**Dendrobium bifarium** Lndl. in Wall. Cat. (1828) n. 2002, nomen nudum; Hook. f. Fl. Brit. Ind. V (1890), 732.

S. 78, Dulit c. 2000 feet above camp, 3rd August, 1932, *E. Shackleton*. "Flower white, labellum pale yellow with white ridges. Stems yellowish."

*Distribution:*—Malay Peninsula, Amboina.

**Dendrobium villosulum** Lndl. Gen. & Sp. Orch. (1830) 86; Hook. f. Fl. Brit. Ind. V (1890), 728. etc.

S. 355, Dulit c. 2600 feet alt., 29th August, 1932, *P. M. Synge.* "Growing on edge of rock under dripping water. Flowers white, spur pale orange. Tip of column yellowish. No scent."

S. 450, Dulit ridge c. 1200 m., 10th September, 1932, *P. M. Synge.* "Growing under waterfall in moss forest. Flowers cream coloured."

S. 459, Dulit ridge c. 1230 m., 10th September 1932, *P. M. Synge.* "Growing on rock crevice in moss forest. Flowers white, pale pinkish brown at base of column."

*Distribution:*—Malay Peninsula, ? Bangka, ? Sumatra.

**Dendrobium lamellatum** Lndl. Gen. & Sp. Orch. (1830), 89. etc.

S. 82, Dulit c. 1500 feet above camp, 4th August, 1932, *P. M. Synge.* "Flower white, labellum yellow on inner surface."

S. 350, Dulit c. 2000 feet alt., 27th August, 1932, *native collector.* "Flowers white, pale green inside hood, two ridges of very pale mauve along edge of column. No scent."

*Distribution:*—Sumatra, Java, Malay Peninsula, Natuna Is., Tenasserim.

**Dendrobium** (§ Calcarifera) **calcariferum** sp. nov.

Caules approximati, elongati, foliosi, graciles. Folia lineari-lanceolata, breviter acuminata, oblique acuta. Inflorescentiæ ad. c. 6-floræ, laxæ. Bracteæ ovatæ, acutæ, breves. Sepalum dorsale ovato-lanceolatum, obtusum. Sepala lateralia oblongo-ovata, subacuta, basi in mentum oblongum anguste obtusum producta. Petala late lanceolata-oblonga, apici truncata minute apiculata. Labellum longe unguiculatum, ungui basi cuneato marginibus pedi gynostemii adnatis medio fere carinis 2 altis parallelis apicem versus divergentibus et margine evanescentibus abrupte donato, lamina obcordata lobis rotundatis carinis 2 sub medio altissimis ex ungui usque ad apicem labelli donata marginibus basi in pulvinum oblongum verrucosum incrassatis superne denticulatis vel eroso-crenulatis. Gynostemii alæ magnæ, subquadratæ, falcatæ, minute apiculatæ.

*Stems* approximate, rather slender, wrinkled, flexuous, c. 42 cm. long, internodes c. 2.80 cm. long. *Leaves* linear-lanceolate, shortly acuminate, obliquely acute, rather thinly coriaceous, c. 9.70 cm. long, 1.30-2 cm. wide, sheath tubular a little shorter than the internode. *Inflorescences* appearing from the upper nodes of the leafy stem first then downwards as the leaves fall, forming an acute angle with the stem, laxly up to c. 6-flowered, peduncle provided with a tubular sheath at the base and a very small ovate acute sheath above c. 1.75 cm. long, rachis c. 3 cm. long. *Bracts* ovate,

acute, c. .15 cm. long. *Dorsal sepal* ovate-lanceolate, obtuse, 7-nerved, c. 1.20 cm. long, c. .60 cm. wide. *Lateral sepals* oblong-ovate, subacute, 7-nerved c. 1.27 cm. long, c. .60 cm. wide, base produced to an oblong mentum with conic narrowly obtuse apex c. 1.10 cm. long. *Petals* broadly lanceolate-oblong from a cuneate base, apex subobliquely truncate with a minute apiculus, 3-nerved with the outer nerves much branched, c. 1.40 cm. long, c. .65 cm. wide. *Lip* long clawed to a little below the middle, blade obcordate with rounded lobes, spread out c. 2.45 cm. long to sinus of lobes, c. 2.70 cm. long to apex of lobes, c. 1.05 cm. wide; claw linear, cuneately narrowed at the base for c. .40 cm. with margins adnate to the column foot, provided about the middle with 2 abruptly elevate keels which are joined at the base and are parallel for c. .35 cm. then diverge abruptly to the margins, c. 1.20 cm. long; blade provided along the middle with 2 rounded keels which run from the claw to the sinus of the apical lobes and are highest about the middle, margins provided at the base with an oblong verrucose cushion, remainder minutely denticulate or erose-crenulate. *Column* including arms c. .43 cm. tall, arms falcate, subquadrate with a minute apiculus c. .20 cm. long. *Column foot* linear, a little incurved towards the apex, c. 1.30 cm. long.

This plant is well characterized by the broad truncate petals fully as broad as the sepals, the bilobed lip with its Λ -shaped keel on the claw, the rounded keels on the blade and the warty cushions on the margins at the base of the blade and the very large subquadrate column arms.

2404, Gunong Balapan, Ulu Tinjar, c. 600-900 m., 2nd November, 1932, *P. W. Richards.* "Perianth segments white with faint magenta stripes except the throat and the spurred petal (? lip) which are tinged with orange-red."

Described from a dried plant.

**Diplocaulobium longicolle** Krzl. in Engl. Pflanzen. IV. 50. II. B. 21, 340; *Dendrobium longicolle* Lndl. in Bot. Reg. XXVI (1840), Misc. 74. etc.

2334, Dulit under 300 m., 26th September, 1932, *P. W. Richards.* "Long perianth segments dull red fading through yellow to cream colour at expanded base. Labellum pale yellow with bright yellow appendage. Rest of flower pale yellow."

*Distribution:*—Malay Peninsula.

**Sarcopodium labuanum** Krzl. in Engl. Pflanzen. IV. 50. II. B. 21, 321; *Dendrobium labuanum* Lndl. in Journ. Linn. Soc. Bot. III (1859), 6. etc.

S. 517, Dulit ridge c. 1350 m., 17th September, 1932, *P. M. Synge.* "Petals outside pink, inside pale pink, lip

pale yellow bright yellow at tip. Column white, tip pale yellow. Pseudobulbs chestnut."

*Distribution:*—Endemic.

**Sarcopodium suberectum** Ridl. in Kew Bull. (1914), 211.

S. 462, Dulit ridge c. 1300 m., 10th September, 1932, *P. W. Richards.* "Flowers pale yellow, labellum white with crimson and yellow markings. Inflorescence dark crimson. Leaves deep green with crimson edges and centre rib. Sweet scent."

*Distribution:*—Endemic.

**Sarcopodium speculum** new comb. *Dendrobium speculum* J. J. S. in Bull. Dep. Agr. Ind. Neerl. V (1907), 34; Ic. Bog. III. (1907) 99, t. 241.

S. 499, Dulit ridge c. 900 m., 16th September, 1932, *P. M. Synge.* "Flowers pale cream, purple stripes on labellum and inside column. Sweet scent. Pseudobulbs deep olive green."

*Distribution:*—Endemic.

***Bulbophyllum pileatum** Lndl. in Bot. Reg. XXX (1844), Misc. 73, etc.

S. 77, Dulit c. 2000 feet above camp, 4th August, 1932, *P. M. Synge.* "Tree trunk in moderate sun in rain forest, about 15 feet from ground. Scentless. Flowers pale orange, labellum yellow with orange streak in centre and crimson on sides."

*Distribution:*—Sumatra, Malay Peninsula.

**Bulbophyllum Lobbii** Lndl. in Bot. Reg. XXXIII (1847), sub t. 29; Bot. Mag. t. 4532. etc.

S. 76, Dulit c. 800 m., 4th August, 1932, *P. M. Synge.* "Flower orange in colour, petals veined red, lip yellow with orange spots. Column slightly spotted red. Red spot on underneath of tip of labellum. No scent." The specimen consists of a single flower without any vegetative parts.

2626, Dulit, 18th November, 1932, *native collector.* "Perianth dull orange yellow marked with dull red." The specimen consists of a single pseudobulb and leaf and an inflorescence and flower.

*Distribution:*—Sumatra, Java, Malay Peninsula, Bali, Siam.

***Bulbophyllum uniflorum** Hassk. Cat. Bog. (1844), 39. etc.

2446, Gunong Balapan, Ulu Tinjar, between 600 and 1000 m., 2nd November, 1932, *native collector.* "Upper lip of flower dull orange, lateral perianth segments orange tinged with magenta, labellum magenta."

*Distribution:*—Sumatra, Java, Malay Peninsula.

*Bulbophyllum fœtidolens Carr. in Gard. Bull. Str. Settle. V (1930), 135, t. III, f. 2.

S. 341, Dulit c. 2000 feet altitude, 27th August, 1932, *P. M. Synge.* "Growing with moss on sloping rock face in primary forest. Flowers dull crimson. Smell very strong of bad carrion."

2481, Ulu Koyan, Dulit c. 1000 m., 7th November, 1932, *native collector.* "Perianth segments pale greenish the apices of the three upper ones tinged with magenta, labellum dull yellow with minute magenta spots."

*Distribution:*—Malay Peninsula.

**Bulbophyllum** (§ Globiceps) **reflexum** A. & S. Orch. VI (1920), 192.

S. 559, Dulit ridge c. 1300 m., 7th October, 1932, *native collector.* "Fairly common. Flowers brownish white with brown centre. No scent. Flower stalk crimson. Leaves bright yellow-green."

*Distribution:*—Endemic.

**Bulbophyllum tacitum** sp. nov.

Pseudobulbi approximati, ovoidei, 1-folii. Folium oblanceolatum ad oblongo-obovatum, coriaceum, basi breviter petiolatum. Inflorescentiæ 2 e basi pseudobulbi, breves, arcuatæ, dense multifloræ. Bracteæ lanceolatæ, acutæ. Sepala extus breviter et sparse pilosa. Sepalum dorsale oblongo-lanceolatum, breviter acuminatum, acutum. Sepala lateralia oblonga, longe caudata, margine antico basi breviter dilatato. Petala e basi unguiculata elliptica vel anguste obovata, acuta. Labellum integrum, marginibus dimidio inferiore erectis contiguisque (sicco), explanatum panduratum, obtusum.

*Pseudobulbs* approximate, base forming an acute angle with the rhizome, apex a little recurved, ovoid, wrinkled when dry, c. .50 cm. long, 1-leaved. *Leaf* oblanceolate, obovate or oblong-obovate, sometimes very shortly acuminate, apex conduplicate acute, coriaceous, up to c. 11 cm. long, 3.60 cm. wide, petiole .50-1.50 cm. long. *Inflorescences* 2 from the base of each pseudobulb, short, concealed by the leaves, peduncle c. 1.30 cm. long, base covered with imbricating tubular sheaths with a larger ovate acute spreading sheath above, rachis thickened many-ribbed arched very densely many-flowered c. 1.20 cm. long. *Bracts* lanceolate, acute, spreading, c. .40 cm. long. *Sepals* shortly sparingly hairy outside. *Dorsal sepal* oblong-lanceolate, shortly acuminate, acute, 3-nerved, c. .47 cm. long, c. .18 cm. wide. *Lateral sepals* oblong, rather abruptly long caudate for c. .28 cm., base falcate, 3-nerved, anterior margin a little dilate at the base, c. .80 cm. long, c. .25 cm.

wide. *Petals* shortly clawed at the base, blade elliptic or narrowly obovate, acute, falcate, 1-nerved, c. .27 cm. long, c. .08 cm. wide. *Lip* entire, margins in the lower ½ erect and contiguous (in dried plants), concave inside, when spread out pandurate obtuse c. .30 cm. long, c. .17 cm. wide, no keels nor calli. *Column* including the arms c. .10 cm. tall, arms cuneate with trilobulate apex, foot oblong strongly incurved towards the apex provided at the base with a short median keel c. .20 cm. long.

This plant is an ally of *B. poekilon* Carr from the Malay Peninsula which it resembles much in habit. The flowers are, however, very different.

S. 26, Marudi near sea level, 25th July, 1932, *P. M. Synge.* "Leaves purplish below, green above. Flowers purplish. Scentless. Flowers hang in clusters completely hidden by leaves."

*Distribution:*—Endemic.

**Bulbophyllum** (§ Hybochilus) **marudiense** sp. nov.

Rhizoma gracillimum, longe repens, ramosum. Pseudobulbi ad c. 2.30 cm. dissiti, ovoidei, rugosi, 1-folii. Folium ovatum vel oblongo-ovatum, tenuiter coriaceum, minute apiculatum, brevissime petiolatum. Inflorescentiæ e basi pseudobulborum vel ex nodiis, brevissimæ, unifloræ. Bractea infundibuliformis. Sepalum dorsale oblongum, triangulari-acuminatum, acutum. Sepala lateralia oblongo-ovata, acuminata, acuta, falcata, margine antico basin versus brevissime dilatato. Petala e basi breviter cuneato-unguiculata oblonga, breviter acuminata, acuta. Labellum explanatum et supra visum ovatum, acuminatum, obtusum, papillosum, basi brevissime cuneato-unguiculatum.

*Rhizome* long creeping, very slender, branched, emitting a few roots from each pseudobulb, c. .04 cm. diam. *Pseudobulbs* up to c. 2.30 cm. distant, ovoid, wrinkled, up to c. .50 cm. tall, c. .25 cm. wide, 1-leaved. *Leaf* ovate or oblong-ovate, minutely apiculate, thinly coriaceous, .50-1.75 cm. long, .35-.65 cm. wide, base very abruptly narrowed to a grooved petiole c. .05 cm. long. *Inflorescence* 1-2 from the base of each pseudobulb or from the nodes, very short, 1-flowered, peduncle c. .20 cm. long base covered with minute tubular imbricating sheaths. *Bract* funnel-shaped, c. .10 cm. long. *Dorsal sepal* oblong, triangular-acuminate from above the middle, acute, 3-nerved, c. .27 cm. long, c. .10 cm. wide. *Lateral sepals* oblong-ovate, acuminate, acute, falcate, keeled on the back, anterior margin a very little dilate near the base, 3-nerved, c. .27 cm. long, c. .13 cm. wide. *Petals* shortly cuneate-unguiculate at the base, blade oblong, shortly acuminate, acute, 1-nerved, c. .15 cm. long,

c. .06 cm. wide. *Lip* base erect recurved above the base, strongly recurved towards the apex, entire, base very shortly cuneate-unguiculate, blade when spread out ovate acuminate obtuse, concave in the lower ½ with a low median elevate nerve, papillose inside, c. .15 cm. long, c. .08 cm. wide. *Column* c. .07 cm. tall, arms ending in a subulate tooth, foot c. .10 cm. long.

This is an ally of *B. acutum* J. J. S. from Sumatra and Java but it differs in the structure of lip and column.

S. 2, Marudi near sea level, 25th July, 1932, *P. M. Synge.* "Sandy forest growing affixed to *Podocarpus* shrubs about 6 feet from ground with small liverwort. Pseudobulbs green. Flowers red."

Described from dried material.

**Bulbophyllum** (§ Aphanobulbon) **flavescens** Lndl. Gen. & Sp. Orch. (1830), 54. etc.

2309, Dulit under 300 m., 21st October, 1932, *P. W. Richards.* "Flowers pale yellow."

*Distribution:*—Sumatra, Java.

**Bulbophyllum exiliscapum** J. J. S. in Bull. Inst. Bot. Hamb. VII (1927), 64, t. X, f. 53.

S. 79, Dulit c. 250 feet above camp, 3rd August, 1932, *P. W. Richards.* "Tree trunk near stream in moderate sun. Flowers white. Scentless."

S. 239, Dulit under 300 m., 18th August 1932, *native collector.* "Tree trunk in primary forest, moderately common. Flowers cream, scentless."

*Distribution:*—Endemic.

**Bulbophyllum barrinum** Ridl. in Sarawak Mus. Journ. I (1912), 32.

S. 155, Dulit c. 300 m., 10th August, 1932, *native collector.* "Flowers creamy. No smell."

S. 514, Dulit ridge c. 950 m., 17th September, 1932, *C. H. Hartley.* "Flowers pale orange-yellow. No scent."

*Distribution:*—Endemic.

**Bulbophyllum** (§ Aphanobulbon) **koyanense** sp. nov.

Pseudobulbi approximati, breves, cylindrici, 1-folii. Folium lineari-oblongum vel lineari-oblanceolatum, apici conduplicatum et obtusum, petiolo canaliculato vagina magna ampliata tubulosa incluso. Inflorescentiæ 2 e basi pseudobulbi folio multo breviores, laxiuscule multifloræ. Bracteæ elliptico-lanceolatæ, acuminatæ, acutæ. Sepala apici carnosa. Sepalum dorsale lineari-oblongum, acuminatum, breviter caudatum. Sepala lateralia ovato-oblonga, acuminata, caudata, basi mentum breve formantia. Petala

oblongo-oblanceolata, breviter acuminata, acuta, dimidio superiore papillosa. Labellum explanatum ovatum, obtusum, marginibus dimidio superiore ciliatis. Gynostemii stelidia porrectis subulatis, pede apicem versus incurvo egibboso.

*Pseudobulbs* approximate, longer than broad, cylindric wrinkled, at first covered together with the petiole in a large loose tubular sheath c. 6.50 cm. long, c. .55 cm. tall, c. .40 cm. diam., 1-leaved. *Leaf* linear-oblong or linear-oblanceolate, apex conduplicate and obtuse, thinly coriaceous, grooved above, keeled beneath, sometimes a little curved, c. 18 cm. long, c. 2.75 cm. wide, petiole grooved more than half concealed at first by the large loose tubular sheath c. 7 cm. long. *Inflorescences* 2 from the base of the pseudobulb, enclosed with the petiole in the basal sheath, much shorter than the leaves, slender, rather laxly many-flowered, peduncle provided at the base with some short tubular sheaths and with c. 3 larger tubular sheaths up to c. 1.70 cm. long with shortly free acute apex at intervals above, c. 5.30-7.50 cm. long, rachis 6-11 cm. long. *Bracts* longer than pedicel and ovary, elliptic-lanceolate, acuminate, acute, 1-nerved, c. .35 cm. long, c. .12 cm. wide. Apex of sepals fleshy and very shortly caudate. *Dorsal sepal* linear-oblong, acuminate, inconspicuously narrowed above the base, 3-nerved, c. .55 cm. long, c. .14 cm. wide. *Lateral sepals* ovate-oblong, acuminate, falcate, 3-nerved, anterior margin roundly produced at the base to form a mentum c. .09 cm. long, c. .55 cm. long, c. .18 cm. wide. *Petals* oblong-lanceolate, shortly acuminate, acute, papillose and fleshy in the upper half, falcate, 1-nerved, c. .17 cm. long, c. .08 cm. wide. *Lip* erect with erect margins at the base, very strongly recurved above the middle, 3-nerved, when spread out ovate, obtuse, margins ciliate above the middle, c. .20 cm. long, c. .12 cm. wide. *Column* short, straight, including the porrect straight subulate stelidia c. .12 cm. tall; foot oblong, apex incurved very shortly free, no callus nor distinct incrassation at the base, c. .15 cm. long. *Anther* ovate, triangularly narrowed towards the obtuse apex, keeled above. *Pollinia* 2, roundly triangular as seen from the side, flattened inside, exappendiculate.

The nearest affinity of this plant appears to be *B. flavescens* Lndl. *var. temelenense* J. J. S. also from Borneo. It differs however in the taller pseudobulbs, longer petioled narrower leaves, the inflorescences enclosed by the large basal sheath and in various details of the parts of the flower.

S. 541, Ulu Koyan c. 950 m., 22nd September, 1932, *P. M. Synge.* "Slight scent. Flowers bright yellow. Flower stalk pale green."

Described from dried material.

**Bulbophyllum** (§ Aphanobulbon) **dulitense** sp. nov.

Pseudobulbi and c. 4 cm. dissiti, breves, cylindrici, 1-folii. Folium oblongum vel oblongo-lanceolatum, apici conduplicatum obtusum, tenuiter coriaceum, basi longe petiolatum, petiolo canaliculato vagina magna ampliata tubulosa incluso. Inflorescentiæ 1-2 e basi pseudobulbi folium multo superantes, densiuscule multifloræ. Bracteæ ovato-lanceolatæ, acutæ. Sepala longe caudata. Sepalum dorsale oblongum, acuminatum. Sepala lateralia triangulari-oblonga, breviter acuminata, margine antico basi breviter rotundatim dilatato. Petala oblanceolata, acuta, basi unguiculata. Labellum integrum, explanatum dimidio inferiore ovato vel suborbiculari, dimidio superiore oblongo obtuso marginibus ciliolatis.

*Rhizome* stout, branched, densely rooting, at first covered with rather fleshy sheaths, c. .55 cm. diam., when dry. *Pseudobulbs* up to c. 4 cm. distant, longer than broad, wrinkled, cylindric, c. .63 cm. tall, c. .55 cm. wide, at first concealed by 3-4 tubular imbricating rather fleshy sheaths of which the uppermost or largest c. 7.50 cm. tall more than half encloses the leaf petiole, 1-leaved. *Leaf* oblong or oblong-lanceolate, apex conduplicate obtuse, rather thinly coriaceous, grooved above, keeled beneath, sometimes a little curved, up to c. 25 cm. long, c. 5.20 cm. wide, base cuneately narrowed to a grooved petiole up to c. 10.50 cm. long. *Inflorescences* 1-2 from the base of the pseudobulb, enclosed with the petiole in the sheath, erect, much longer than the leaves; peduncle stout, provided at the base with some short tubular sheaths and with c. 5 larger tubular sheaths at intervals above of which the upper 2 or largest measure c. 6 cm. in length, c. 33 cm. long; rachis rather dense, subverticillate towards the base, c. 29 cm. long. *Bracts* much longer than pedicel and ovary, ovate-lanceolate, acute, 1-nerved, c. .75 cm. long, c. .20 cm. wide. *Dorsal sepal* oblong, acuminate, long caudate, 3-nerved, in all c. 1.10 cm. long, c. .15 cm. wide, caudate part c. .45 cm. long. *Lateral sepals* triangular-oblong, shortly acuminate, long caudate, 3-nerved, anterior margin very shortly roundly dilate at the base, in all c. 1.30 cm. long, c. .24 cm. wide at the base, caudate part c. .60 cm. long. *Petals* oblanceolate, acute, clawed at the base, 1-nerved, papillose in the upper half with ciliolate margins, c. .24 cm. long, c. .07 cm. wide. *Lip* entire or inconspicuously 3-lobed with the lobes rounded, base concave with erect margins, recurved convex above the middle, 3-nerved, spread out ovate or suborbicular in the lower half, oblong obtuse with ciliolate margins in the upper

half, c. .32 cm. long, c. .13 cm. wide. *Column* including the porrect straight subulate stelidia c. .10 cm. long, clinandrium margin with a minute tooth on each side; foot oblong, apex a little incurved and very shortly free, transversely thickened at the base, c. .16 cm. long. *Pollinia* 2, roundly triangular, flattened inside, exappendiculate.

This plant is allied to the preceding but is much larger in all parts and has different sepals.

S. 516 (type), Dulit ridge c. 1250 m., 17th September, 1932, *P. M. Synge.* "Flowers cream, labellum and tip of column pale yellow. Slight sweet scent."

S. 478, Dulit ridge c. 1200 m., 14th September, 1932, *native collector.* "Flowers pale cream, tip of column yellow."

Described from dried plants.

**Bulbophyllum breviflorum** Ridl. in Stapf in Trans. Linn. Soc. Ser. 2, IV (1894) 326.

S. 445, Dulit ridge c. 1230 m., 7th September, 1932, *P. M. Synge.* "Moss forest. Flowers creamy yellow."

*Distribution:*—Endemic.

**Bulbophyllum Gibbsiæ** Rolfe in Gibbs in Journ. Linn. Soc. XLII (1914), 149.

2477, Ulu Koyan c. 800 m., 7th November, 1932, *P. W. Richards.* "Flowers uniform pale creamy yellow. Leaves succulent."

*Distribution:*—Endemic.

**Bulbophyllum** (§ Aphanobulbon) **teres** sp. nov.

Pseudobulbi approximati ad 1.50 cm. dissiti disciformes, 1-folii. Folium teres, succosum, supra canaliculatum, basi petiolato-angustatum, apici pungens. Inflorescentiæ 1-2 e basi pseudobulbi, folia superantes, densiuscule multifloræ. Bracteæ ovatæ, acuminatæ, acutæ. Sepalum dorsale oblongum, obtusum. Sepala lateralia falcata, ovata, acuminata, obtusa. Petala e basi breviter unguiculata oblanceolata, obtusa, subfalcata, glabra. Labellum integrum, glabrum, ecallosum, oblongum., obtusum. Pes gynostemii egibbosus.

*Rhizome* creeping, branched, densely rooting, c. .25 cm. diam., internodes up to c. .65 cm. long. *Pseudobulbs* approximate to 1.50 cm. distant, disciform, forming an acute angle with the rhizome, concealed at first together with the leaf base by large tubular sheaths, wrinkled, c. .20 cm. long and as broad, 1-leafed. *Leaf* recurved from the base, straight or curved, terete, succulent, grooved above, apex pungent, base narrowed in the form of a petiole, up to 9.40 cm. long, c. .45 cm. diam. *Inflorescences* 1-2 from within

the remains of the sheath at the base of the pseudobulb, longer than the leaves, rather densely many-flowered, peduncle almost entirely concealed by loose tubular imbricating sheaths up to c. 3 cm. long, rachis up to c. 8 cm. long. *Bracts* a little exceeding half the length of pedicel and ovary, ovate, acuminate, acute, c. .15 cm. long. *Dorsal sepal* oblong obtuse, 3-nerved, c. .33 cm. long. c. .13 cm. wide. *Lateral sepals* falcate, ovate, acuminate, obtuse, anterior margin indistinctly roundly dilate above the base, 3-nerved, keeled on the back, c. .30 cm. long, c. .20 cm. wide. *Petals* shortly clawed at the base, blade oblanceolate, obtuse, subfalcate, 1-nerved, entirely glabrous, not papillose, apex very shortly thickened, c. .17 cm. long, c. .06 cm. wide. *Lip* entire, concave in lower half, recurved convex in upper half, glabrous or minutely papillose towards the apex, 3-nerved, keels O, spread out oblong obtuse c. .18 cm. long, c. .13 cm. wide. *Column* c. .08 cm. tall, stelidia triangular acuminate acute; foot oblong, apex very shortly free and a little incurved, callus at base *O. Pollinia* 2, roundly triangular, flattened inside, exappendiculate.

This plant is perhaps nearest to *B. Gibbsiae* Rolfe. In vegetative characters it much resembles the Javanese *B. alliifolium* but it is of stouter habit, the inflorescences are denser and the flowers rather different. As in the case of *B. stipitatibulbum* J. J. S. the pseudobulbs appear to be stipitate owing to the fact that the new shoots do not arise from the last node but from one lower on the rhizome.

S. 535, Dulit ridge c. 1350 m., 20th September, 1932, *P. M. Synge.* "Flowers pale brownish yellow, column brighter yellow. Slight bitter scent."

Described from dried plants.

**Bulbophyllum** (§ Aphanobulbon) **densissimum** sp. nov.

Pseudobulbi c. 5 cm. dissiti, cylindrici, breves, 1-folii. Folium oblongum, apici conduplicatum obtusum, longe petiolatum petiolo basi vagina magna tubulosa celato. Inflorescentiæ e basi pseudobulbi, densissime multifloræ. Bracteæ lanceolatæ, acutæ. Sepala petalaque carnosa, dimidio inferiore papillosa, sepala caudata. Sepalum dorsale oblongum, longe acutatum. Sepala lateralia triangulari-oblonga, margine antico basi leviter dilatato. Petala valde falcata, subulata, acutissima. Labellum manifeste 3-lobum, bicarinatum carina minore interposita, lobis lateralibus rotundatis, lobo intermedio subulato obtuso.

*Rhizome* stout, creeping, covered with the remains of old sheaths, very densely rooting, c. .70 cm. diam., internodes c. .60 cm. long. *Pseudobulbs* c. 5 cm. distant, longer than broad, cylindric, wrinkled, at first concealed by rather fleshy

sheaths, c. 1.15 cm. tall, c. .60 cm. wide when dry, 1-leaved. *Leaf* oblong, apex conduplicate and obtuse, fleshy, coriaceous, grooved above, keeled beneath, c. 24 cm. long, c. 6.50 cm. wide, base narrowed gradually to a grooved petiole c. 14 cm. long the base of which is concealed within some large loose tubular fleshy sheaths up to c. 7 cm. long. *Inflorescences* erect from within the sheaths at the base of the pseudobulb, very densely many-flowered, peduncle stout with c. 3 tubular sheaths at the base and 4 loose larger ones at intervals above c. 18 cm. long, rachis nodding 10 cm. or more long. *Bracts* much longer than the pedicel and ovary, lanceolate, acute, c. .75 cm. long. *Sepals* and *petals* fleshy, papillose in the lower half. *Dorsal sepal* oblong, long acutate for c. .35 cm, 3-nerved, c. 1.10 cm. long, c. .17 cm. wide. *Lateral sepals* triangular-oblong caudate for c. .42 cm., 3-nerved, falcate, c. 1.25 cm. long, c. .25 cm. wide at the base. *Petals* strongly falcate, subulate, very acute, 1-nerved, margins minutely erose in the lower half, c. .70 cm. long, c. .10 cm. wide. *Lip* 3-lobed, provided inside with 2 papillose keels which rise at the margins at the base of the side lobes converge and join about the middle of the midlobe, elevate above the base into a transversely oblong papillose cushion which is produced at the apex to a short median keel, spread out c. .30 cm. long, c. .16 cm. wide across the side lobes, sidelobes broadly rounded with the margins minutely denticulate, midlobe recurved subulate obtuse convex fleshy with the margins minutely serrate-denticulate c. .17 cm. long. *Column* including the porrect straight subulate stelidia c. .27 cm. long, stelidia c. .13 cm. long; foot scarcely free, strongly incurved above the middle, oblong, c. .18 cm. long, calli at base O. *Pollinia* 4 in 2 pairs, the inner of each pair rudimentary triangular, the outer roundly triangular and flattened inside.

The nearest ally of this plant appears to be *B. macrophyllum* Krzl., also a Sarawak species, but it differs from that plant according to the description in the smaller leaves, shorter inflorescence with comparatively longer peduncle and very dense rachis of much larger flowers. Both species have comparatively large petals.

S. 98, Dulit c. 2000 feet above camp, 4th August, 1932, *native collector*. "Tree near trail in upper limits of rain forest. Flowers creamy. Smell slight and sweet. Red scale leaves (? sheaths) on flower stem."

Described from dried material.

**Bulbophyllum** (§ Aphanobulbon) **grandilabre** sp. nov.

Pseudobulbi c. .60 cm. dissiti, 1-folii. Folium oblongo-oblanceolatum, obtusum, breviter petiolatum. Inflorescentiæ e basi pseudobulbi, gracillimæ, 1-floræ (? semper). Bractea

ovata, acuta. Sepalum dorsale oblongum, acutum. Sepala lateralia latissime ovata, acuminata, sigmoidea. Petala lanceolata, subacuta, dimidio superiore minute papillosa marginibus ciliolatis. Labellum pro sectione magnum, oblongo-lanceolatum, acuminatum, obtusum vel inconspicue emarginatum, basi carinis brevissimis papillosis 2 donatum, marginibus basi excepta ciliatis. Pes gynostemii egibbosus.

*Pseudobulbs* c. .60 cm. distant, disc-like, covered with fibres of old sheaths, c. .15 cm. tall and as broad, 1-leaved. *Leaf* oblong-lanceolate, obtuse, coriaceous, grooved above, keeled beneath, c. 2.40 cm. long, c. .50 cm. wide, base twisted and narrowed to a grooved petiole c. .45 cm. long which is almost entirely hidden by a large sheath. *Inflorescences* erect from the base of the pseudobulb as long as the leaf (? or longer), 1-flowered (? always), peduncle very slender provided at the base with some tubular sheaths and c. 2 longer tubular sheaths at intervals in the lower half c. 3 cm. long. *Bracts* ovate, acute, c. .30 cm. long. *Dorsal sepal* oblong, acute, 3-nerved, c. .65 cm. long, c. .23 cm. wide. *Lateral sepals* very broadly ovate, acuminate, subacute, sigmoidly curved, anterior margin incurved near the apex, 3-nerved, c. .60 cm. long and as broad. *Petals* lanceolate, subacute, minutely papillose in the upper half with ciliate margins, 1-nerved, c. .40 cm. long, c. .10 cm. wide. *Lip* relatively very large for the section, entire, oblong-lanceolate, acuminate, obtuse or inconspicuously emarginate, nerves 3 inconspicuously elevate in the dried flower, papillose towards the apex, provided inside above the base with 2 short papillose keels, margins ciliate except at the base, spread out c. .63 cm. long, c. .32 cm. wide. *Column* including the very short subulate stelidia c. .17 cm. long; foot linear, strongly incurved towards the very shortly free apex, callus at base O, c. .50 cm. long.

This is a very distinct species characterized by the 1-flowered (? always) inflorescence, the comparatively large flower with very broad lateral sepals and the large ciliate lip with 2 short basal keels. Unfortunately the material consists only of a portion of a rhizome c. 1.10 cm. long with 2 pseudobulbs, a single leaf and inflorescence.

S. 135, Dulit c. 500 m., 8th August, 1932, *P. M. Synge.* "Flowers yellow, borne singly, cream. No scent."

Described from the dried plant.

**Cirrhopetalum mastersianum** Rolfe in Lindenia VI (1890), 33, t. 255.

S. 134, Dulit c. 500 m., 8th August, 1932, *P. M. Synge.* "Stem reddish. Labellum yellow. Two side petals small, brown, post petals (lateral sepals) united, large, orange-

brown in colour. No scent." The material consists of a portion of an inflorescence alone.

*Distribution:*—Endemic.

***Cirrhopetalum linearifolium** Ridl. in Journ. Linn. Soc. XXXII (1896), 283; *Bulbophyllum stenophyllum* Ridl. Mat. I (1907), 83.

2659, Marudi forest reserve under 300 m., November, 1932, *native collector*. "Epiphyte near the ground, 'heath' forest. Flowers creamy yellow marked with dark crimson."

*Distribution:*—Malay Peninsula.

**Cirrhopetalum rhombifolium** sp. nov.

Pseudobulbi approximati, ovoidei, plus minusve quadrilaterales, 1-folii. Folium rhombeo-ellipticum vel rhombeo-lanceolatum, obtusum, interdum mucronulatum, tenue. Inflorescentiæ e basi pseudobulbi, 2-floræ, quam folia multo breviores. Bracteæ ovato-lanceolatæ, acuminatæ, acutæ. Sepalum dorsale oblongum, apicem versus in acuminem gracilem longum abrupte angustatum. Sepala lateralia basi torta excepta omnino connata, lanceolata, longe caudata, margine antico basin versus rotundatim dilatato. Petala falcata, anguste triangularia, acuminata, obtusa, minute mucronata. Labellum carnosum, anguste ligulatum, rotundatim recurvum, supra sulcatum.

*Pseudobulbs* approximate to 1.20 cm. distant, ovoid, more or less 4-sided with concave sides, up to c. 1.90 cm. long, c. .90 cm. diam., 1-leaved. *Leaf* rhombeo-elliptic or rhombeo-lanceolate, obtuse, sometimes with a minute mucro, thin in texture, keeled beneath, up to c. 10.50 cm. long, c. 2.40 cm. wide, petiole grooved up to c. 1.20 cm. long. *Inflorescence* from the base of the pseudobulb, much shorter than the leaves, 2-flowered, peduncle clothed at the base with some short imbricating sheaths c. 6.25 cm. long, rachis thickened and flattened c. .30 cm. long. *Bracts* ovate-lanceolate, acuminate, acute, c. .65 cm. long. *Flowers* glabrous. *Dorsal sepal* oblong, abruptly narrowed to an acumen c. .35 cm. long, cucullately convex outside below the acumen, 5-nerved, in all c. 1-10 cm. long, c. .37 cm. wide. *Lateral sepals* except near the twisted falcate base connate for the whole length, lanceolate, long caudate with the caudate part grooved above and very acute, very fleshy, 3-nerved at the base with the lateral nerves branched, c. 6.10 cm. long, c. .55 cm. wide. *Petals* falcate, narrowly triangular, acuminate, obtuse with a minute mucro, keeled outside towards the apex, 3-nerved, c. .47 cm. long, c. .24 cm. wide at the base. *Lip* fleshy, narrowly ligulate, obtuse, roundly curved, margins produced at the base to a short

rounded lobe, above grooved almost to the apex highly convex above the middle, beneath provided with a tall grooved keel, not spread out c. .30 cm. long, c. .17 cm. wide. *Column* c. .30 cm. tall, margin of clinandrium minutely denticulate, stigma oblong with a large rounded cushion beneath; foot c. .55 cm. long, apex ending in 2 divaricate papillose lobules.

This plant is a near ally of *C. biflorum* J. J. S., a native of Java, Borneo and possibly the Malay Peninsula. It differs, however, in the shorter not clavate acumen of the dorsal sepal, the very much narrower petals with obtuse apex only very minutely mucronate and in the lateral sepals the apex of which is very acute and slender not at all broadened.

2362, Dulit under 300 m., 30th October, 1932, *P. W. Richards.*

Described from a dried plant and a flower preserved in spirit.

**Cymbidium Finlaysonianum** Lndl. Gen. & Sp. Orch. (1833), 164. etc.

S. 40, Marudi near sea level, 27th July, 1932, *P. M. Synge.* "Sepals yellowish green with red stripe. Labellum pinkish. Pollinia yellow. Scentless."

*Distribution:*—Sumatra, Java, Malay Peninsula, Celebes, Sula Is., Philippines.

**Bromheadia brevifolia** Ridl. in Journ. Linn. Soc. Bot. XXXII (1896), 340.

S. 540, Ulu Koyan c. 850 m., 22nd September, 1932, *native collector.* "Flowers pinkish-magenta on outside, labellum magenta inside. Side petals cream. Column magenta at base."

*Distribution:*—Malay Peninsula.

**Oxyanthera micrantha** Brongn. in Dup., Voy. Cog. (1834), 198, t. 37 B. etc.: *Thelasis micrantha* J. J. S. in Fl. Buit. VI (1905), 495, Atlas f. CCCLXXIV. etc.

S. 349, Dulit c. 1500 feet alt., 27th August, 1932, *native collector.* "Flowers very pale orange on outside, white inside."

*Distribution:*—Sumatra, Java, Malay Peninsula, Philippines.

***Phreatia listrophora** Ridl. in Journ. Linn. Soc. Bot. XXXII (1896) 307.

S. 533, Ulu Koyan c. 950 m., 19th September, 1932, *native collector.* "Flowers pale pink. No scent."

*Distribution:*—Malay Peninsula.

**Thecostele alata** Par. & Rchb. f. in Trans. Linn. Soc. XXX (1874), 135, 144, t. 29. etc.

S. 632, Niah under 300 m., November, 1932, *P. M. Synge.* "Petals and labellum pale yellow with crimson streaks and blotches. No scent."

*Distribution:*—Sumatra, Java, Malay Peninsula, India, Philippines.

**Acriopsis javanica** Reinw. Fl. Lit. II (1825), 4. etc.

S. 58, Dulit 2nd August, 1932, *P. M. Synge.* "Petals white with broad magenta stripe. Labellum white with magenta stripes".

S. 439, Dulit ridge c. 1230 m., 6th September, 1932, *P. M. Synge.* "Flowers pale green. Labellum brown." The leaves of this are small and fleshy but I can find no difference in the structure of the flowers.

*Distribution:*—Sumatra, Java, Malay Peninsula, Celebes, Moluccas, Tenasserim, Philippines.

***Thrixspermum acuminatissimum** Rchb. f. Xen. Orch. II (1867), 121. etc.

S. 45, Marudi near sea level, 27th July, 1932, *P. M. Synge.*

*Distribution:*—Sumatra, Java, Malay Peninsula, Philippines.

**Sarcochilus indusiatus** comb. nov. *S. stenoglottis* Hook. f. Fl. Brit. Ind. VI (1890), 34. *Thrixspermum indusiatum* Rchb. f. in Gard. Chron. (1886), i, 585.

S. 385, Dulit under 300 m., 2nd September, 1932, *P. M. Synge.* "Flowers creamy white, labellum dead white. Two faint purple streaks at base of lateral petals. No scent."

*Distribution:*—Sumatra, Malay Peninsula.

**Sarcochilus membraniferus** sp. nov.

Caulis 15 cm. longus vel longior, validus, foliosus. Folia lineari-oblanceolata, oblique subacuta, crasse carnosa, basi in forma petioli angustata. Inflorescentiæ ad 3 superpositæ, breves, c. 4-floræ, rachide facie floræ in membranas 2 tenues valde elevata. Bracteæ late triangulari-ovatæ, subacutæ. Flores simultanei. Sepalum dorsale ovato-ellipticum, obtusum, tubercula conica extus sub apice. Sepala lateralia late ovata, obtusa, falcata, extus apicem versus breviter sed conspicue carinata. Petala oblonga, obtusa. Labellum mobile, brevissime unguiculatum, 3-lobum, calcaratum, carnosum, lobis lateralibus cuneatis obtusissimis, lobo intermidio minuto tuberculiformi basi in lobulos 2 falcatos subulatos quam lobos laterales multo breviores instructo, calcare carnosissimo supra carinato.

*Stem* up to 15 cm. long or more, stout, leafy, rooting at intervals, c. .50 cm. diam., internodes up to 1.15 cm. long. *Leaves* c. 11 together, linear-oblanceolate, obliquely subacute, thickly fleshy, narrowed in the form of a petiole and concave at the base, up to c. 11.50 cm. long, c. 1.50 cm. wide, sheaths tubular fleshy. *Inflorescences* up to 3 superposed from the base of the internodes behind the leaves, short, c. 4-flowered, peduncle rather flattened elliptic in section up to c. 2.30 cm. long with an ovate bract-like sheath at the base and another below the middle, rachis up to c. 3.30 cm. long the internodes dilate above each flower into 2 parallel tall thin half lanceolate membranes which taper upwards and are up to c. .25 cm. tall above the base. *Bracts* broadly triangular-ovate, subacute, embracing the base of the membranes of the rachis, keeled on the back, c. .35 cm. long, c. .83 cm. wide. *Flowers* open together, sepals and petals very fleshy. *Dorsal sepal* ovate-elliptic, obtuse, a conic tubercle outside below the apex, 5-nerved with the outer nerves branched above the base, c. 1.20 cm. long c. .58 cm. wide. *Lateral sepals* running to the apex of the column foot, broadly ovate, obtuse, falcate, a short conspicuous keel outside at the apex, 5-nerved with the outer nerves branched above the base, c. 1.20 cm. long, c. .80 cm. wide. *Petals* oblong, obtuse, 3-nerved with the outer nerves branched above the base, c. 1.05 cm. long, c. .38 cm. wide. *Lip* mobile on the apex of the column foot, shortly clawed, 3-lobed, spurred, minutely papillose, c. 1 cm. long to tip of spur, c. .88 cm. wide across the side lobes; side lobes cuneate or cuneately dilate from an oblong base, very obtuse, c. .33 cm. long, c. .20 cm. wide at the apex; midlobe represented by 2 falcate subulate lobules c. .17 cm. long with a minute tubercle between; spur elongate-conic, narrowly obtuse, a little dilate beneath above the base thence flattened to the tip, conspicuously keeled above, entrance c. .08 cm. diam., walls very fleshy. *Column* curved, keeled on the back, c. .50 cm. long, rostellum produced to a subulate beak, foot forming about a right angle with the column straight dilate at the apex into 2 rather divergent rounded lobules c. .47 cm. long. *Anther* suborbicular, beak very short truncate. *Pollinia* 2, subpyriform, grooved nearly to the base, caudicle narrowly oblong a little narrowed about the middle c. .23 cm. long, disc ovate.

A distinct species characterized by the very fleshy leaves, short lax inflorescences, few flowers and by the tall membranes on the rachis.

*Gardens Bulletin, S.S.*

S. 455, Dulit ridge c. 1230 m., 10th September, 1932, *native collector*. "Flowers pale orange, crimson ring at base of petals. Flower stalk has prominent light green sheath. Slight sweet scent. Aerial roots conspicuous."

Described from a dried plant.

**Sarcochilus hirtulus** Hook. f. Fl. Brit. Ind. VI (1890), 39.

S. 200, Dulit under 300 m., 15th August, 1932, *P. M. Synge*. "No scent. Labellum white. Hood yellow. Wings yellow spotted red, as also post petal."

*Distribution:*—Malay Peninsula.

**Adenoncos triloba** sp. nov.

Caulis e basi pendula ascendens, basi dense radicans, ramosus. Folia valde arcuata, linearia, pungentia, crasse carnosa, intus concava, extus alte convexa. Inflorescentiæ breves, 1-2-floræ. Bracteæ ovatæ, acutæ. Sepala oblonga, acuminata, acuta, lateralibus extus conico-apiculatis. Petala oblonga, obtusa. Labellum 3-lobum, intus dimidio inferiore super basin carina papillosa donatum, lobis lateralibus triangularibus truncatis, lobo intermedio breviter et late obovato, obtusissimo, subtruncato, apice brevissime apiculato-acuminato.

*Stem* ascending from a pendulous base, branched and densely rooting at the base, up to c. 16 cm. long, c. .20 cm. diam., internodes c. .25-.85 cm. long. *Leaves* strongly arched, linear, pungently apiculate, thickly fleshy, concave inside, highly convex keeled beneath, 1.10-4 cm. long, sheaths tubular ribbed and minutely transversely wrinkled. *Inflorescences* 1-2-flowered, peduncle minute, rachis c. .20 cm. long. *Bracts* ovate, acute, c. .15 cm. long. *Dorsal sepal* oblong, triangular-acuminate, acute, margins incurved towards the apex, 1-nerved, c. .30 cm. long, c. .15 cm. wide. *Lateral sepals* oblong, acute, keeled on the back and conic-apiculate at the apex, c. .35 cm. long, c. .17 cm. wide. *Petals* oblong, obtuse, 1-nerved, c. .27 cm. long, c. .075 cm. wide. *Lip* 3-lobed fleshy, provided inside in the deeply concave lower half above the base with a papillose keel which reaches the base of the midlobe, spread out c. .52 cm. long, c. .35 cm. wide across the side lobes; side lobes erect, triangular, truncate; midlobe shortly and broadly obovate, very obtuse almost truncate, shortly bluntly apiculate-acuminate, inside deeply concave at the base. *Column* c. .16 cm. tall, rostellum triangular. *Anther* transversely elliptic, beak minute rounded.

This is apparently nearest to *A. vivax* J. J. S. from Sumatra from which it differs in the 2-flowered inflorescences and flowers with a different lip much broader across the side lobes than across the midlobe. From the Bornean

*A. saccata* J. J. S. it differs in the shorter fewer-flowered inflorescence, and the distinctly 3-lobed lip with different keel and no transverse constriction beneath.

S. 603, Niah under 300 m., November, 1932, *P. M. Synge.* "Flowers pale orange. Leaves fleshy, incurved and semicircular in transverse section."

Described from dried plants.

**Trichoglottis cuneilabris** sp. nov.

Caulis elongatus, foliosus. Folia anguste oblongo-elliptica vel oblongo-lanceolata, apici obliqua obtusa, carnosa. Inflorescentiæ ad 4 superpositæ, brevissimæ, 1-3 floræ. Bracteæ brevissimæ, breviter et late ovatæ, subacutæ. Sepalum dorsale anguste elliptico-oblongum, obtusum. Sepala lateralia calcaris basi brevissime adnata, lanceolato-oblonga, breviter acuta, obtusa, margine antico super basin rotundatim dilatato. Petala oblongo-oblanceolata, breviter acutata, obtusa. Labellum 3-lobum, calcaratum, fauce calcaris carinis 2 tortis trans lobos laterales productis et ibi pilosis donatum, calcare conico obtuso dorso complanato, lobis lateralibus usque ad medium gynostemii adnatis parte libera anguste triangulari acuminata acuta, lobo intermedio e basi angusta late cuneato-dilatato apici trilobulo lobulis exterioribus rotundatim triangularibus obtusis lobulo intermedio parvo semiorbiculari carinis 3 papillosis e basi usque ad medium fere donato. Gynostemium basi lamella oblonga truncata pilosa et ciliata usque ad apicem loborum lateralium vix attingente lobis lateralibus parallela donatum.

*Stem* elongate, rooting, branched, leafy, up to c. 19 cm. long, c. .30 cm. diam., internodes c. 2 cm. long. *Leaves* narrowly oblong-elliptic or oblong-lanceolate, oblique and obtuse, fleshy, grooved above, keeled beneath, base twisted and narrowed, sheath tubular ribbed. *Inflorescences* from the base of the internodes behind the leaves, up to 4 together, up to c. .80 cm. long, 1-3-flowered. Bracts, minute, shortly and broadly ovate, subacute c. .10 cm. long. *Dorsal sepal* narrowly elliptic-oblong, obtuse, 3-nerved c. 1.05 cm. long, c. .24 cm. wide. *Lateral sepals* very shortly adnate to the base of the spur, lanceolate-oblong, shortly acutate, obtuse, anterior margin roundly dilate above the base, subfalcate, 5-nerved, c. 1 cm. long, c. .35 cm. wide. *Petals* oblong-lanceolate, shortly acutate, obtuse, minutely papillose especially towards the base, 3-nerved, c. .95 cm. long, c. .24 cm. wide. *Lip* 3-lobed, spurred, fleshy, c. .75 cm. long from tip of spur to apex of midlobe, c. .70 cm. wide across the side lobes; spur conic, obtuse, flattened on the back, provided at the entrance with 2 conspicuous diverging twisted keels which are produced across the side lobes as low hairy ridges and provided inside on the back with an

oblong truncate hairy lamella with ciliate margins which rises from the column, lies parallel to the side lobes and does not quite reach to their apex, c. .20 cm. long; side lobes adnate to the column about to the middle, the free part triangular subulate-acuminate acute c. .22 cm. long; midlobe very broadly cuneate from a very narrow base, apex 3-lobulate, the outer lobules large roundly triangular obtuse, the median lobule small semiorbicular, provided with 3 rounded papillose keels which are dilate upwards and reach from the base to about the middle. *Column* c. .40 cm. tall. arms subulate very short.

This is a near ally of *T. celebica* Rolfe with which it agrees well in habit and in the leaves. The flowers are however, quite distinct. In his description of *T. celebica* Rolfe did not mention the two very tall papillose keels on the blade of the midlobe which is deeply and subequally 3-lobed from about the middle. The lip is described as glabrous whereas I find it distinctly papillose.

2407, Gunong Balapan, Ulu Tinjar, c. 600-900 m., 2nd November, 1932, *native collector*. "Perianth yellow mottled with scarlet."

**Trichoglottis Smithii** nom. nov. *T. quadricornuta* J. J. S. in Bull. Jard. Bot. Buit. Ser. 3. IX (1927) 188.

2637, Sungei Tru, Ulu Tinjar, under 300 m., 23rd November, 1932, *native collector*. "Perianth segments creamy white marked with orange-brown; labellum white with deep magenta spots."

A new name is necessary for this plant as the name *T. quadricornuta* is preoccupied by Kurz (Journ. As. Soc. Beng. XLV (1876), II, 156, t. XIII, f. 1-7).

*Distribution:*—Endemic.

**Robiquetia spathulata** J. J. S. in Nat. Tijdschr. Ned. Ind. LXXII (1912) 115; Orch. Jav. Atlas. f. CDLVI. etc.

S. 624, Niah under 300 m., November, 1932, *P. M. Synge*. "Tree overhanging small stream. Petals reddish brown with white stripe in centre, spur creamy. Post petal hood-like. Slight sweet scent."

*Distribution:*—Sumatra, Java, Malay Peninsula, Moluccas, Philippines, India.

**Tæniophyllum** (§ Brachyanthera) **kapahense** sp. nov.

Caulis brevis, dense radicans. Radices elongati, supra subtusque complanati. Inflorescentiæ breves, paucifloræ, glabræ. Bracteæ alternatim bifariæ, ovatæ, conico-apiculatæ, intus profunde concavæ. Sepalum dorsale elliptico-oblongum, obtusum. Sepala lateralia basi calcaris labelli breviter adnata, e basi brevissime unguiculata ovata,

obtusa. Petala falcata, lineari-oblonga, obtusa. Labellum integrum, calcaratum, oblique quadratum, obtusum, valde concavum, calcare e basi angusta ovoideo obtuso quam laminam longiore. Gynostemium breve, latum, brachiis stigmatis brevibus rotundatis, rostello ovato bifido.

*Stem* short, very densely rooting, c. .50 cm. long. *Roots* elongate, flattened above and beneath, narrowly elliptic in transverse section, c. 9 cm. long, c. .20 cm. wide, c. .10 cm. thick, appressed to the substratum. *Inflorescences* short, few-flowered, glabrous, peduncle c. .25 cm. long, rachis forming an obtuse angle with the peduncle flexuous c. .40 cm. long. *Bracts* alternate, ovate conspicuously conic-apiculate beneath, deeply concave within. Sepals and petals glabrous. *Dorsal sepal* elliptic-oblong, obtuse, 1-nerved, c. .20 cm. long, c. .08 cm. wide. *Lateral sepals* shortly adnate to the base of the spur, very shortly clawed, blade ovate obtuse, keeled on the back, 1-nerved, c. .20 cm. long, c. .10 cm. wide. *Petals* falcate, linear-oblong, obtuse, 1-nerved, c. .20 cm. long, c. .05 cm. wide. *Lip* entire, spurred, blade obliquely subquadrate obtuse the lateral angles erect rounded deeply concave inside c. .20 cm. long c. .23 cm. wide, spur narrowed at the base ovoid obtuse above c. .25 cm. long. *Column* c. .12 cm. tall and as broad, stigmatic lobes short rounded, rostellum ovate shortly bifid. *Anther* transversely oblong, narrowed in front to an oblong truncate or very inconspicuously retuse convex beak.

Kapah without number.

Described from spirit material.

**Tæniophyllum affine** Schltr. in Fedde Repert. IX (1911), 294.

S. 187, Dulit under 300 m., 13th August, 1932, *P. M. Synge*. "Flowers minute, whitish yellow. Leaves (roots) green, straplike."

*Distribution:*—Endemic.

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# ADDITIONS AND CORRECTIONS TO RIDLEY'S FLORA OF THE MALAY PENINSULA.

*By E. D. Merrill, Director, New York Botanical Garden.*

The following notes were prepared in connection with the identification of several important recent collections of Sumatra plants; as in connection with any general work on the flora of Sumatra it is essential to take into consideration the standard publications appertaining to the flora of the Malay Peninsula. The additions to the list of known Malay Peninsula species are, with one exception, in the nature of introduced and naturalized plants. The corrections involve some new binomials where Mr. Ridley used preoccupied specific names, and one substitution of an older name than the one used by him.

## CHLORIS SWARTZ.

**Chloris tenera** (Presl) Scribn. in Rept. Missouri Bot. Garden **10**: 41. *pl. 40. f. 2.* 1899; Merr. in Bull. Soc. Bot. France **73**: 28. 1926.

*Cynodon tener* Presl Rel. Hænk. **1**: 291. 1830.

*Chloris obtusifolia* Balansa in Morot, Journ. de Bot. **4**: 166. 1890.

*Chloris ridleyi* Hack. in Oester. Zeitschr. **52**: 237. 1902.

*Eustachys obtusifolia* A. Camus in Lecomte Fl. Gén. Indo-Chine **7**: 541 1923.

*Chloris ridleyi* Hack. was based on a specimen collected by Ridley in Pahang, and there is a specimen of this collection in the Kew Herbarium. It is therefore rather strange that Ridley should have overlooked the species in the preparation of his treatment of the Gramineæ in his Flora of the Malay Peninsula (1925). This distinctly characteristic species is now known from Sumatra, Malay Peninsula (Pahang), Indo-China, Hainan, Philippines (Luzon, Negros, Bohol), Celebes, Gilolo, Amboina, and New Guinea.

## ARISTOLOCHIA TOURNEFORT.

Attention is called to a curious error in Ridley's treatment of *Aristolochia tagala* Cham., Fl. Malay. Penin. **3**: 17. 1924 (excl. f. 136.). The description correctly calls for cordate leaves, but the illustration represents a species remote from Chamisso's species, a form with non-cordate leaves, and a species not described among the four admitted

by Ridley. I suspect that Ridley's figure 136 erroneously named *Aristolochia tagala* actually to represent *A. indica* Linn., a species not recorded from the Malay Peninsula but one that possibly occurs there in cultivation.

## CLEOME LINNAEUS.

**Cleome ciliata** Schum. & Thonn. in Dansk. Vid. Selskabs. Skriften 4: 67. 1827 (Beskr. Guin. Plant. 294. 1827); Oliv. Fl. Trop. Afr. 1: 78. 1868.

*Cleome guineensis* Hook. Niger Fl. 218. 1849.

Penang, *Haniff 331,* December 1928, Singapore, *Clemens 22514,* November 1929. Of comparatively recent introduction and naturalization here as it is in Java and Sumatra. Native of tropical Africa.

## MEMECYLON LINNAEUS.

**Memecylon perakense** nom. nov.

*Memecylon gracilipes* Ridl. in Journ. Straits Branch Roy. As. Soc. 79: 72. 1918, Fl. Malay Penin. 1: 811. 1922, non C. B. Robinson 1911.

A new name is manifestly needed for the Malay Peninsula form described by Ridley because of his oversight of Robinson's previous use of the same specific name for a very different Philippine species.

## RUELLIA PLUMIER.

**Ruellia tuberosa** Linn. Sp. Pl. 635. 1753.

Singapore, along streets, *Clemens,* November, 1929. Introduced from tropical America and more or less naturalized in several places in the Peninsula as it now is in parts of India, Sumatra, Borneo, and Java.

## IXORA LINNAEUS.

**Ixora ridleyi** nom. nov.

*Ixora crassifolia* Ridl. in Journ. Straits Branch Roy. As. Soc. 79: 83. 1918, Fl. Malay Penin. 2: 98. 1923, non Merr. 1910.

A new name is needed here because of my use of *crassifolia* for a Philippine species eight years before Ridley's species was described.

## BORRERIA G. F. MEYER.

**Borreria lævis** (Lam.) Griseb. Fl. Brit. West Ind. 1: 349. 1861; Backer & Van Sloot Jav. Theeonkr. 205. *f. 205.* 1924.

*Spermacoce laevis* Lam. Tabl. Encycl. 1: 273. 1791.

Singapore, Changi, *Clemens 22512,* November 1929, on the seashore. Malay Peninsula, without locality, *Lim Boon Keng.* Recently introduced and naturalized here as

it is in Java, Sumatra, Philippines (Jolo), New Britain, New Guinea (Sepik Ririu), and Samoa. Native of tropical America where it is widely distributed.

## PENTAPHRAGMA WALLICH.

**Pentaphragma ellipticum** Poulsen in Kjœb. Vid. Med. Nat. Foren. Kobenh. 321 *pl. 4-5.* 1903.

*Pentaphragma ridleyi* King & Gamble in Journ. As. Soc. Beng. 74(2): 57. 1905 (Mater. Fl. Malay. Penin. 4: 267. 1905); Ridl. Fl. Malay Penin. 2: 202. 1923.

Poulsen's publication antedates that of King and Gamble by two years, and his excellent description and illustration clearly shows that *Pentaphragma ellipticum* Poulsen is identical with *P. ridleyi* King & Gamble.

## ELEURANTHERA POITEAU.

**Eleuranthera ruderalis** (Sw.) Schulz.-Bip. in Bot. Zeit. 24: 239. 1806.

*Melampodium ruderale* Sw. Fl. Ind. Occ. 1372. 1806.

Singapore, *Clemens 22570,* November, 1929, in waste places. Introduced and naturalized here as it is in Java and Sumatra. The genus is not included in Ridley's Flora of the Malay Peninsula.

## A NECTRIA PARASITIC ON A LIVERWORT: WITH FURTHER NOTES ON NEOTIELLA CROZALSIANA

*By E. J. H. Corner, Botanic Gardens, Singapore.*

In Pahang, four years ago, when scanning with a lens a gingerleaf covered with liverworts, I descried upon a certain species the tiniest red fruit-bodies. Before returning to Singapore I collected as many leaves with the liverwort as possible and keeping them alive in the laboratory for a few days I drew up this account of a new species of Nectria. It resembled so closely the discomycete, *Neotiella crozalsiana*, that I determined to compare them, the more particularly as doubts had been expressed on my interpretation of that species, whether it were not truly a pyrenomycete. In England, in 1933, I collected fresh material of *N. crozalsiana*, from the wood where I discovered it, and having checked my previous account I reaffirm its correctness and may now, with a bryophilous pyrenomycete for comparison, vindicate my standpoint. I have for distribution abundant dried material of both species and a little of *N. crozalsiana* in formalin-alcohol. To Dr. Fr. Verdoorn, of Leiden, I am indebted for the identification of the liverwort.

**Nectria** (Dialonectria) **egens** n. sp.

Mycelium superficiale, ex hyphis hyalinis separatis, non contextis, reticulato-ramosis, haud raro in ramis brevibus inter se conjunctis, 2.5—4$\mu$ latis, in valleculis inter parietes convexos superficiales cellularum foliorum et stipitum hospitalium appressis, compositum: hypharum cellulæ 6—20$\mu$ longæ, membranis 1—1.5$\mu$ crassis, quæque hyphopodio uno, parvo, subgloboso, subsessili, tenuiter tunicato, 3—4$\mu$ longo x 2—3$\mu$ lato, præditæ.

Perithecia 95—150$\mu$ alta, 65—105$\mu$ lata, *sparsa*, solitaria vel raro bina, amphigena ad folia hospitis marginem versus disposita, *minutissima*, pyriformia, ostiolata, *glabra*, tenera, *aurantio-rubra*, collo brevi plus minus distincto 20—34$\mu$ longo x 18—25$\mu$ lato prædita. *Paries perithecii* 12—20$\mu$ crassus, dense plectenchymaticus, hyphis contiguis, e stratis duobus compositus: *strato externo* 1—2 cellulas crasso, luminibus cellularum 5—12 x 1—3$\mu$, ex hyphis crasse tunicatis pigmento plus minus deficientibus contexto: *strato interno* 2—3 cellulas crasso, luminibus cellularum 6—14 x 4—10$\mu$, ex hyphis tenuiter tunicatis granulis aurantiacis plenis contexto. *Periphyses numerosi*, in collum projicientes, haud emergentes, e cellula una aut cellulis duobus granulis aurantiacis plenis compositi: cellulæ terminales periphysium inferiorum cylindricæ, 12—16 x 3—4$\mu$; periphysium superiorum minores 6—8 x 2—3.5$\mu$, pigmentoque plus minus deficientes. *Paraphyses nulli.*

Asci 40—46 x 9—10$\mu$, 8-sporati, subventricosi, apicibus obtusis, tenuiter tunicati, inoperculati, ostiolo simplici iodo non cœrulescenti dehiscentes.

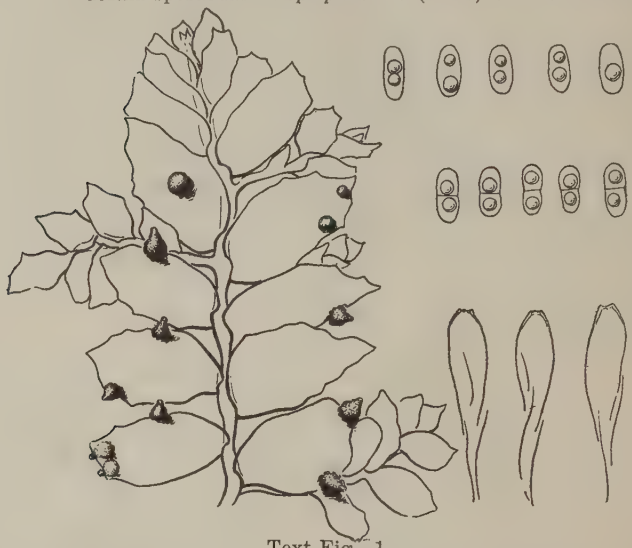
Sporæ 8—9.5 x 3.5—4$\mu$, irregulariter instructæ, *albae*, *hyalinae*, *ellipsoideae*, leves, tenuiter tunicatæ, intus nebulosæ, guttis

duobus raro singulis hyalinis aut leniter flavidis, 2—2.5$\mu$ latis præditæ, *tandem saepe septum transversum plus minus medium inter guttas duas deponentes sed haud vel leniter ad septum constringentes.*

Conidia non visa.

Hab. in foliis stipitibusque *Leptolejeuneae corynephorae* (Nees) Schiffn., ad folia zingiberis crescentis, parasitica, in silvis paludosis prope Tembeling, Pahang, peninsulæ malayanæ, Nov—Dec. 1930.

Species habitu, mycelio parasitico sparso superficiali hyphopodiato atque peritheciis glabris solitariis valde distincta: forma sporarum *N. episphaeriae* (Tode) similis.



Text-Fig. 1.

*Leptolejeunea corynephora* with the perithecia of *Nectria egens*, × ca. 50: ascospores and apices of dehisced asci of *N. egens*, × 1000.

The living hyphæ are applied to the host so closely that unstained they are invisible, the perithecia appearing unattached. Saffranine, eosine and iodine are ineffective but cotton-blue stains the protoplasm intensely by which means the hyphæ can be traced. They have a habit which distinguishes them at once from those of moulds and stray spores which sprout in profusion in the felt of liverworts. They lie in the grooves between the outer convex walls of the cells of the liverwort, in most cases singly, and at the corners of the host-cells, over the junctions of their anticlinal walls, each hyphal cell bears a hyphopodium, Text-Fig. 3. The mycelium, on stem and leaves, has the form of a network with hyphopodia at the nodes, and almost every intercellular groove may be occupied. The hyphæ rarely traverse the face of the host-cells: they never grow

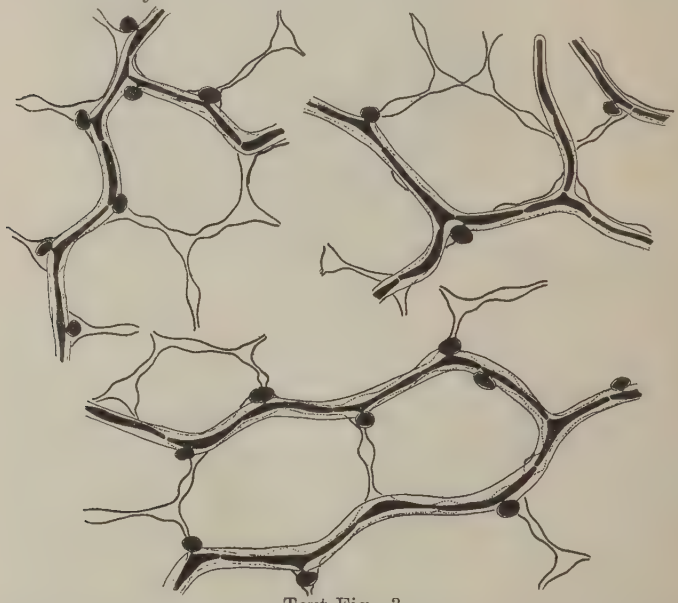
into the air vegetatively: and I did not succeed in detaching them. At the edge of a leaf they follow round the grooves to the other side and they progress from leaf to leaf along the stem. They may reach young leaves which are half-grown but they do not penetrate the growing-point, and they die off from old leaves which are browning. There are no haustoria and the cells of the host suffer no obvious harm.

Text-Fig. 2. The perithecium of *Nectria egens* in section: × 800.

The perithecium originates from a short hypha which projects 10—20$\mu$ from the leaf. A few laterals from the hypha interweave contiguously to form a knot which then differentiates into the two layers of the perithecial wall. The outer hyphæ of the knot become thick-walled with colourless lumen; the inner hyphæ remain thin-walled and acquire an abundance of carotin in the form of granules and droplets. The knot enlarges by the branching of the internal hyphae, by the growth of the ascogenous hyphae and by the elongation of the cells of the outer layer. It remains globose until some 60$\mu$ wide when the neck is

formed. The internal tissue in expanding presses upon the external layer and forces it out as the neck on the side away from the leaf: this weakened area probably corresponds with the apex of the primordium opposite the original hypha over which the laterals merely closed by arching and interweaving of their extremities, the remainder of the wall being compounded of the body of the hyphæ. But the external layer does not give way until the perithecium is full-sized, when the ostiole appears in the neck by rupture or dissolution. The neck is not formed by apical growth after the ostiole. Air-spaces are absent and the perithecium, in spite of its thick-walled outer layer, is soft and easily crushed under the weight of a coverslip.

Two or three short hyphæ grow from the base of the perithecium as a rudimentary mycelium and by adhering to the leaf may attach it the more securely. They are narrow, thick-walled, 2.5—4$\mu$ wide, up to 40$\mu$ long, and consist of one or two cells containing a little orange pigment, and with simple obtuse ends. But the perithecia are easily dislodged—by the lightest touch of a needle—and as they often develop at the edge of a leaf, poised even on a leaf-tooth, it is a wonder they do not tumble off; rain must remove many of them.



Text-Fig. 3.

Hyphæ of *N. egens* above the cells of the leaf of *L. corynephora*: the hyphæ stained with cotton-blue, the shrunken protoplasm being shown black: hyphopodia at the junctions of the anticlinal walls; × 800.

It seems that the asci are feeble and discharge their spores with little vigour so that they barely escape the ostiole. I placed coverslips over patches of the liverwort with fresh perithecia, hoping that some would be directed towards them, but no spores arrived even when scarcely .5 mm. away and left for 2—3 days. Neither do the spores emerge in tendrils nor collect in a powder round the neck, though some may be seen at times just within the ostiole of freshly mounted perithecia.

Some ginger-leaves were dried for 2—4 days and then moistened: the liverwort turned brown and did not revive but the perithecia seemed healthy. When dried for 7—8 days and then moistened the perithecia also discoloured. But being unable to observe spore-discharge I could not determine the resistance of the perithecia to desiccation.

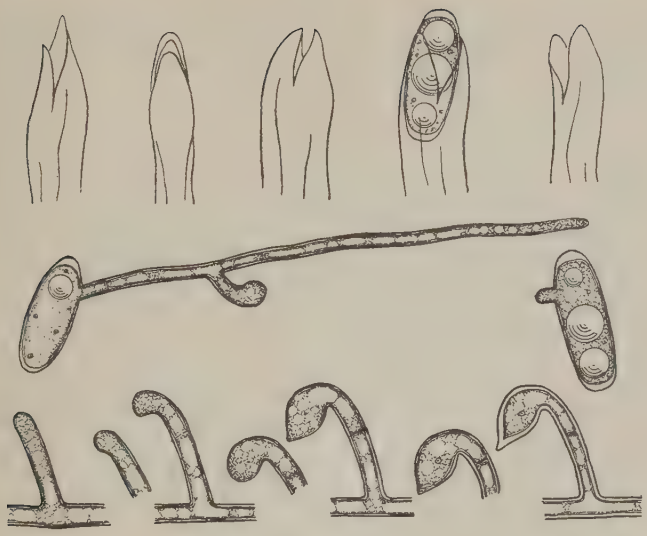
The fungus is a parasite because it does not grow on the surrounding ginger-leaf or on other species of liverworts or lichens on the same leaves and it is intimately connected with its host. Its source of food is not, however, obvious. Were there haustoria they would stain with cotton-blue and in all probability would have some visible effect on the cells of the host, but while dead cells do occur in the leaves of the liverwort they have no connection with the Nectria and generally contain the very narrow hyphæ of a mould. The hyphæ must tap the flow of food in those parts of the cellulose walls which are immediately beneath the surface of the liverwort, and with their hyphopodia. These organs, which are borne regularly over the junctions of the anticlinal walls, are like the hyphæ very closely pressed to the surface of the host and they seem to be thin-walled over the part which is in contact. All the food which passes from the leaves into the stem and whatsoever flows in the opposite direction must traverse the anticlinal walls of the leaves and the only barrier between the hyphopodia and this flow of food is exceedingly thin cuticle. It cannot be more difficult to extract food from a liverwort this way than it is for a lichen-hypha to extract food from a thick-walled gonidium: and the alternative that in the grooves on the liverwort collects some matter to the special liking of the fungus is improbable. The curious distribution of the perithecia follows also the parasitic habit. The perithecia develop only on the leaves and mostly on their distal halves which are the areas of greatest photosynthesis because the cells of the leaves have many more chloroplasts than those of the stem and the distal halves of the leaves are better illuminated as they do not overlap.

The fungus does not interfere with the growth of its host. Infected plants, dotted with perithecia, bore numerous sporogonia in all stages of development and they appeared as large and vigorous as uninfected plants. At most it is a weak parasite as one would expect from its powers of attack.

## SYSTEMATIC POSITION

At the instance of *Neotiella crozalsiana,* the affinity of specialised, reduced ascomycetes cannot be inferred directly from the form of the ascocarp. In this case, however, the fungus is certainly a pyrenomycete and the perithecium a normal body. The asci are inoperculate and though this is a property of inoperculate discomycetes few of them possess carotin, and the structure and texture of the perithecium, the form of the spores and the absence of paraphyses are typical of Nectria. Several Nectriæ are bryophilous but none of the bryophilous Inoperculeæ, or indeed any genus of the family, has any close connection with *N. egens.* The other bryophilous Nectriæ, *e.g. N. muscivora* (B. et Br.) v. Hœhn.,*Calonectria Brongniartii* (Cr.) Sacc., *C. duplicella* (Nyl.) Karst., and *Pseudonectria Metzgeriae* v. Hœhn., have larger perithecia seated on a white floccose subiculum, representing a less degraded state of the stroma, and larger spores than *N. egens,* which in its minuteness and meagre mycelium is the most depauperate: in general appearance and spore-characters it approaches *N. episphaeria.* Yet in one respect it seems aberrant. The asci of *N. egens* discharge through a distinct, if immarginate, foramen. In Nectria typically, according to Tulasne, de Bary and Pethybridge, though there seem to have been no exact observations in recent years, the walls of the asci deliquesce at maturity and the mass of spores liberated inside the perithecium is squeezed through the ostiole in a slimy tendril. But to what extent are these bryophilous species really cogeneric with other Nectriæ which may be saprophytes or parasites of most diverse order preferring stems, leaves or fruits, ferns, fungi, algæ, lichens or even insects? This large group of such uniform construction appears but formally classified at present at levels of convergence and without regard for sequence of environment or or biological trend. Not merely as Fusaria do they appeal for physiological enquiry.

The hyphopodia resemble those of such Perisporiaceæ as Balladyna or the appressoria of Erysiphaceæ. The intracellular haustorium may have evolved from such a rudiment.



Text-Fig. 4.
*Neotiella crozalsiana*: apices of dehisced asci, germinating spores, and stages in the development of the haustorial branch: × 500.

## NEOTIELLA CROZALSIANA Grelet

A few details may be added to my previous account, c.f. Text-Fig. 4. The asci dehisce through a bilabiate slit which is generally more or less median and longitudinal but which is occasionally so oblique as to appear as an elongate lid. Several germinating spores were found on the leaves of the host. A single germ-tube arises near one end of the spore and as it grows the oil-drops in the spore dwindle and disintegrate. When the germ-tube is about 100$\mu$ long, the first cell is cut off near the spore and from this cell a haustorial branch grows out: as in mildews and other ectoparasites the germ-tube sinks a haustorium at the first opportunity. The haustorial branch is formed by apical growth and acropetal thickening of the wall. It starts obliquely forward, in the direction of the apex of the parent hypha, for a distance of 10—50$\mu$, then by unilateral expansion it turns sharply at right angles towards the parent hypha: the apex dilates into the body of the appressorium and contracts again into the beak. The wall thickens more rapidly and extensively on the exposed parts and hence it seems that the thin-walled expansion which

becomes the appressorium is turned inward by the more rapid hardening of the outer side: this arrangement will also press it firmly to the leaf. Several infected host-plants had healthy young sporogonia.

## COMPARISON OF NECTRIA EGENS AND NEOTIELLA CROZALSIANA

Both fungi are bryophilous with a superficial mycelium upon which the ascocarps are scattered singly without stroma or tapesium. The ascocarp is a perithecium with an ostiole, periphyses, a mucilage-cavity and a wall which is similarly differentiated in each into two layers, the hyphæ of the inner layer containing carotin. They differ this way:—

1. The hyphæ of *N. crozalsiana* boldly traverse the surface of the host with free ærial ramifications and they bear elaborate intracellular haustoria composed of 1—2 cells: those of *N. egens* are confined within the intercellular grooves and bear minute sessile hyphopodia without haustoria, the hyphopodia being appendages of the hyphæ not branches.

2. The ascocarp of *N. crozalsiana* is hairy, that of *N. egens* glabrous.

3. The ostiole in *N. crozalsiana* is bounded by a palisade of clavate hyphal ends, which is lacking from *N. egens.*

4. The paraphyses of *N. crozalsiana* contain carotin at least in the proximal cells: paraphyses are lacking from *N. egens.*

5. The ascus of *N. crozalsiana* is 5-times longer and 3-times broader than in *N. egens*: it opens by slit in *N. crozalsiana* and a pore in *N. egens.*

6. The spores of *N. crozalsiana* are four or five times longer and broader than those of *N. egens* and they are triguttate and continuous: those of *N. egens* are biguttate and uniseptate.

7. The asci of *N. crozalsiana* discharge the spores forcibly for a distance of 3 cm. or more: those of *N. egens* are so feeble that the spores barely clear the ostiole and do not travel a distance of even one millimetre.

In points 2—7 *N. crozalsiana* is an operculate discomycete and *N. egens* a pyrenomycete. In the Operculeæ a secondary mycelium always develops copiously from the base of the ascocarp, with which part the fruit-body of

*N. crozalsiana* is homologous, but rarely or scantily from the perithecia of pyrenomycetes: in a reduced operculate discomycete one would therefore expect a hairy ascocarp but not necessarily in a pyrenomycete. The margin of the apothecium in the Operculeæ is nearly always determinate from a greater or less amount of marginal growth, but in pyrenomycetes marginal growth from the ostiole appears exceptional. On account of the mechanical and constructional function of the paraphyses in apothecia, they are especially characteristic of discomycetes and always persist to maturity: in pyrenomycetes they are commonly lacking or are diffluent and disappear at maturity, and they are absent from most Nectriæ. Wide asci and wide spores characterise the Operculeæ, narrow asci and narrow spores the Nectriæ. Generally in the Operculeæ the asci have a transverse or slightly oblique lid, though in some typical Aleuriæ and Pezizeæ, as Phillipsia and Cookeina according to Bœdijn, it is so oblique as almost to be a slit, and it is a longitudinal slit in Boudierella and Ascozonus; a slit rather than a lid may be related to the large size of the spores or projectile. In all the Operculeæ the asci dehisce with great vigour: in the Nectriæ they dehisce either very feebly or liberate the spores by dissolution of the walls. And if it still can be argued that *N. crozalsiana* is a pyrenomycete, either it belongs in the Hypocreales in which case the first point must be considered whether in the same family two bryophilous pyrenomycetes could have evolved with such radically different modes of parasitism and spore-dispersal, c.f. the uniformity of the Erysiphales and Uredinales, or it represents an unknown order. My interpretation of the fruit-body, as a persistently juvenile form of cleistocarpic apothecium, clearly stands the test and with the abundance of information which it supplies concerning the evolution of the ascocarp it seems also the most natural. Given, in fact, a cleistocarpic apothecium maturing at so early a stage, it could but be perithecioid. The resemblance between *N. crozalsiana* and *N. egens* is one of convergence, enhanced by their reduced and simplified construction, and I do not doubt that *Nectriella Lophocoleae* Massal. is another such humariaceous discomycete, if it is not indeed the same species as *N. crozalsiana.*

As for the general relation of fungi to bryophytes, whether a phylum of such primitive repute supports a fungus-flora of a primitive stamp, there is yet insufficient knowledge to declare, but if, as in this case, the fungi are degenerate that opinion of the Bryophyta must also be revised.

## SUMMARY

*Nectria* (Dialonectria) *egens,* found in Malaya, is described as a new species parasitic on the liverwort *Leptolejeunea corynephora.* It is ectoparasitic with the hyphæ in the grooves between the convex superficial walls of the host. Haustoria are absent but food appears to be absorbed from the host through hyphopodia placed over the anticlinal walls. The asci dehisce feebly through an immarginate pore.

Supplementary details are given on the dehiscence of the ascus, the germination of the spores and the development of the haustorial branch in *Neotiella crozalsiana.* My former account of *N. crozalsiana* is confirmed and a comparison with the true pyrenomycete, *N. egens,* supports the contention that the perithecioid fruit-body of *N. crozalsiana* is but a persistently juvenile form of cleistocarpic operculate apothecium.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## ARACEAE MALESICAE

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In this paper five new species are described, *viz:* **Cryptocoryne Nurii, Pothos borneensis, P. kinabaluensis, Raphidophora kinabaluensis** and **Schismatoglottis retinervia.** Of these only the first mentioned is from the Malay Peninsula, the rest being from Borneo; and of these latter, three are endemic on the Kinabalu Mountains, while the fourth is recorded also from Sarawak. Three new names are proposed because the species in question were published under already preoccupied names: **Homalomena lunduensis** (*H. multinervia* Ridl. of 1907, not *H. multinervia* Ridl. of 1902), **Pothos Ridleyanus** (*P. elipticus* Ridl., not Moon ex Miquel), and **Raphidophora Rosenburghii** (*R. crassifolia* v.A.v.R., not of Hook. f.). Twelve species are reduced: *Cryptocoryne grandis* Ridl. (=**C. cordata** Griff.), *C. pontederiifolia* Schott *sensu* Ridl. (=**C. johorensis** Engl.), *Pothos ovatifolius* Engl. (=**P. Rumphii** Schott), *Raphidophora Burkilliana* Ridl. (=**R. Maingayi** Hk. f.), *R. conocephala* v.A.v.R., *R. crassifolia* Hk. f., *R. nigrescens* Ridl. and *R. Wrayi* Hk. f. (=**R. silvestris** Engl.), *R. lancifolia* Schott (=**R. calophyllum** Schott), *R. Schottii* Hk. f. (=**R. hongkongensis** Schott), *Scindapsus hederaceus* Schott *sensu* Merrill (=**S. pictus** Hassk.) and *S. longisitipitatus* Merr. (=**S. perakensis** Hk. f.). *R. peepla* (Roxb.) Schott is redefined and all misconceptions that had gradually developed concerning this species have been eliminated. These reductions or redefinitions of the species have in some cases resulted in extending the distribution range, which in other cases has become restricted. A notable example of this restriction is *R. peepla,* which was regarded to occur wild in a very extensive region from India, Ceylon, Indochina, Borneo to Moluccas (cf. Engler et Krause in *Pflanzenr.* Hft. 37, 1908 p. 41; Ridley in *Journ. Linn. Soc. XLII* 1914, p. 171; Merrill, *Enum. Bornean Pl.* 1921, p. 89). Actually the species is known only from a small region in Assam (ie. Silhet) and appears to be very rare since it has not been collected again for the last one hundred years. The only specimens yet existing are those collected by Fernandez (Wallich's plant collector), Roxburgh's collections having been lost unless we assume that Wallich used Roxburgh's material to make his numbered sets. The other material that went by the name of *R. peepla* has been shown to belong to 5 distinct species exclusive of the Moluccan material which I have not seen and which may prove to be *R. Storckiana* Schott. *Pothos Rumphii* Schott which was known formerly only from the Philippines, Moluccas, Celebes and New

Guinea (cf. Merrill, *Enum. Phillip Pl.* I, 1922, p. 173) and recently from Sumatra (cf. v. Ald. v. Rosenburgh, in *Bull. Jard. Bot. Buitz.* IV, 1922, p. 337) has been recorded here from Borneo and Pulau Tioman, an island off the east coast of the Malay Peninsula.

The Key given by Engler and Krause in the *Pflanzenreich* Hft. 37 (1908) for the indentification of the *Raphidophora* species having undivided or unperforated leaves has been found to be unsatisfactory since its main divisions are made on the basis of the length of the leaves. This criterion is apt to mislead one to regard specimens of the one and the same species having different length as belonging to different species. Hence a *Key* calculated to lead to more natural and less confusing main groups has been suggested (*vide* observ. under *R. silvestris*).

My thanks are due to the Director of the Royal Botanic Gardens, Kew, the Director of the Botanical Gardens and Museum, Berlin-Dahlem and to the Keeper of British Museum (Botany), London, for providing me facilities to work in their respective herbaria and for permission to consult the herbarium collections under their charge.

The specimens cited are from the Singapore herbarium except when otherwise stated.

1. **Cryptocoryne cordata** Griff. Not. III (1851) 138 et. Ic. Pl. Asiat.III (1851) t. 172; Engl. Arac. Exsicc. et Illustr. no. 6; Hook f. Flor. Brit. Ind. VI (1893) 493; Ridl. Mat. Flor. Mal. Pen. III (1907) 4; Engl. Pflanzenr. IV. 23. F.=73 (1920) 242; Merr. Enum. Born. Pl. (1921) 108; Ridl. Flor. Mal. Pen. V (1925) 86.

   *C. grandis* Ridl. in Journ. Roy. As. Soc. Str. Br. 44 (1905) 170; Engl. Pflanzenr. IV. 23. F.=73 (1920) 243; Merr. Enum. Born. Pl. (1921) 108. ***syn. nov.***

   I cannot find any difference between the typical *C. cordata* and Ridley's *C. grandis.* Burn-Murdoch's specimen, for instance, collected on Bukit Tapis in Pahang (comm. sub. n. 213) matches exactly with the type of *C. grandis* (Sarawak, leg. Haviland, n. 2319, in Herb. Sing.) not only as regards the length of the leaves and of the spathes but even as to the structure of the spadix and the venation of the leaves and Burn-Murdoch's specimen is clearly *C. cordata.* No doubt most of the specimens of this species preserved in various herbaria have much smaller leaves with much shorter petioles but such variations are dependent in this species not only on the age of the plant but also upon the depth of water in which they grow. Assuming that some of the smaller forms are specifically distinct from the larger ones, a new name should then

be given to the smaller ones, for Griffith's species as represented by his plate and specimens is a larger form.

2. **Cryptocoryne johorensis** Engl. in *Engl.* Pflanzenr. IV. 23 F=73 (1920) 244.

*C. pontederiifolia* Schott *sensu* Ridley Mat. Flor. Mal. Pen. III (1907) 5 et Flor. Mal. Pen. V (1925) 8 f. *syn. nov.*

MALAY PENINSULA: *Johore,* between Gunong Pulai and Johore Bahru (Mat. comm. Ridley sub n. 3721. Type in Singapore, isotype in Kew); Track to Gunong Pulai (Ridley, 12, 141 in Singapore, Kew and British Museum).

Apparently Engler had not seen Ridley's *Materials* (*op cit.,* 1907) for he makes the following observation on this species: "Hæc species ex herbario Singaporense sub nomine *C. pontederiifolio* distributa est, at ab ea, cujus spatha incognita est, differt foliorum lamina minore atque minute denticulata." Nor does it appear that Ridley had consulted Engler's monograph on *Cryptocoryne* when preparing the Malayan material for his *Flora* (*op cit,* 1925), for he has entirely omitted Engler's species in it.

3. **Cryptocoryne** (§ Bitubulosæ) **Nurii** Furtado spec. nov.

Affinis *C. Walkeri* Schott ut videtur, sed folio crassiore et majore, basi cuneato, (haud abrupte contracto), petiolo crassiore, spathæ limbo latiore, explanato (haud torto), differt. A *C. Wightii* Schott folio breviore sed latiore, spathæ limbo latiore et cordato recedit.

*Rhizoma* circ. 5 mm. crassum. Foliorum *petiolus* circ. 17 cm longus, ad 3–9 cm longitudinis vaginatus; *lamina* elliptico-lanceolata, utrinque cuneata, basi sensim in petiolum transiens, apice acuta, 10–18 cm. longa, 3 cm. lata, supra viridis, subtus pallidior, margine crispata vel crispatulata, nervis primariis lateralibus utrinsecus 3–4, infra medium a costa abeuntibus, oblique adscendentibus, superioribus apicem versus arcuatim convergentibus, omnibus pagina superiore obscuris. *Pedunculus* circ. 7–12 cm longus, 2–3 mm in diam. *Spathae* tubus inflorescentiam includens 2–2.5 cm longus, circ. 0.5 cm in diam.; superior tubo inferiore angustior, 5.5–12 cm. longus, circ. 0.3 cm in diam.; limbus in vivo atro-purpureus ut videtur, cordatus, apice caudato-acuminatus, cum cauda 1.5 cm longa 4–5 cm altus, basi 1.5 cm –2.5 cm latus. *Inflorescentia foeminea* 3 mm longa, a mascula aequilinga laxiflora intersitio nudo, tenuissimo, 1 cm longo sejuncta. *Pistilla* fertilia 5, stilis quam flores rudimentarii duplo longioribus.

MALAY PENINSULA: *Johore* at Sungei Pelepah (Nur, 20038. Type in Herb. Singapore and Kew).

*C. Walkeri* and *C. Wightii* are the only other *Cryptoryne* species which have so long a peduncle to the inflorescence. In *C. Walkeri* the leaves are much smaller, thinner in texture and abruptly contracted at the base.

The limb of its spathes is twisted and not cordate. *C. Wightii* has much narrower and elongate leaves with crispate-undulate margins, and spathes terminating in a much narrower, not cordate limb. In leaves the species appears very much like *C. ciliata* (Roxb.) Fisch. which belongs to the *Section Ciliatae* Engl. and which has also very much longer petioles to the leaves.

4. **Homalomena** (§ Euhomalomena) **lunduensis** Furtado, nom. nov.

*H. multinervia* Ridl, in Journ. Roy. As. Soc. Str. Br. XLIX (1907) 49; Merr. Enum. Born. Pl. (1921) 95. [non *H. multinervia* Ridl,. in Journ. Bot. XL (1902) 36.]

BORNEO: *Sarawak,* Lundu (Ridley in Sept. 1905, Type in Singapore).

The binomial *H. multinervia* Ridl. is preoccupied for a species belonging to the section *Chamaecladon* and hitherto known only from Mount Ophir in Malacca.

5. **Pothos** (§ Allopothos, ser. Longevaginati) **borneensis** Furtado spec. nov.

Affinis *Pothoi Kingio* Hk. f., sed folio majore, valide inæquilatero, nervis collectivis folii pluribus, nonnullis supra mediam orientibus, spadice spathæ æquilongo, pistillis apicem versus subito attenuatis in stigma sensim transientibus (haud truncatis vertice stigmate conoideo abrupte instructis) recedit. Folia eis *Pothois Rumphii* Schott sat similia, sed a hac specie spatha latiore basi decurrente, pistillo oblongo subito angustato (haud truncato) ex tepalis valde exserto differt.

Scandens. *Rami* infra-axillares, internodiis ad 4 cm longis et 1 cm crassis. *Petiolus* ad circ. 25 longus, ad geniculum 8 mm longum usque late vaginatus, vagina in ochream (=auriculas) circ. 8 cm longam (longas) producta. *Lamina* petiolo 1½–plo longior, valide inaequilatera, altero latere alterius ½ latitudine aequante, elliptico-oblanceolata, maxima latitudine supra mediam sita, utrinque attenuata, apice subito acuminata, basi obtusa vel cordulata, circ. 35 cm longa, 10–12 cm lata, nervis collectivis pluribus, apicem versus margini arcuatim approximatis, intimis plerumque supra mediam a costa abeuntibus, lateralibus primariis quam tertiarii validioribus, porrectis. Pedunculi gemini, 7–9 cm longi, 3–4 mm crassi, in axiliis cataphyllorum nascentes, cataphyllis circ. 9 cm longis, apice in caudam filiformem circ. 2 cm longam contractis. *Spatha* reflexa, concavato oblongo-vel ovato-lanceolata, apice abrupte cuspidata, stipite spadicis decurrens, pars libera circ. 4–6 cm longa, 3 cm lata, in vivo lutea ut videtur. *Spadix* ad 2 cm stipitatus, stipite spathæ fere omnino adnato, cylindricus, spathæ æquilongus vel ea paullo

longior vel brevior, 4–6 cm longus, 1–1.8 cm in diam., fructiferus major. *Stamina* 6, tepalis æquilonga, circ. 2–2.5 mm longa. *Pistillum* oblongum, apicem versus subito attenuatum, summo stigmate sessile coronatum, ex involucro tepalorum exsertum. circ. 4 mm longum. *Bacca* ovata, sæpe trisperma, ad 1 cm. longa, 0.5–6 cm. crassa.

BORNEO: *Sarawak*: Limbang (Hewitt in July 1905. Type in Kew and Singapore); Bidi (Brooks, in February 1908 quoad inflorescentia). *Kinabalu Mts,* near Dallas, alt. circ. 3000 ft. (Clemens, 26542).

The Kinabalu specimen has somewhat smaller and comparatively broader leaves and shows signs that they are taken from a vigorous growing shoot, but the flowering material is very meagre to say whether it represents a distinct form.

6. **Pothos** (§ Allopothos, ser. Longevaginati) **kinabaluensis** Furtado spec. nov.

Species ex affinitate *Pothois insignis* Engl. et *P. lancifolii* Hk. fil., ab illa spadice non stipitato atque a hac folio multo majore cum nervis collectivis utrinsecus 3, petiolo longiore, vagina latiore facile distinguitur. Folia eis *Pothois insignis* Engl. valde similia.

Scandens. *Rami* infra-axillares, internodiis ad 8 cm longis, 0.5 cm crassis, ramulorum tenuioribus. *Petiolus* 10–18 cm longus, fere ad geniculum 1–1.5 cm longum usque late vaginatus, vagina apice paullo auriculata. *Lamina* petiolo æquilonga vel eo paullo longior, inæquilatera, altero latere alterius ¾ latitudine æquante, ovato-oblonga, basi rotundata, ima obtusa vel cordulata, apice subito vel sensim longe acuminata, cum acumine 1.5–2 cm longo 15–23 cm longa, 5–10 cm lata, nervis lateralibus primariis pluribus, utrinque æquicrassis, angulo 60° a costa mediana abeuntibus, nervis collectivis utrinsecus 3–4, intimo interdum super mediam laminæ partem oriente, a margine 0.8–2 cm remoto, duobus exterioribus margini approximatis. *Pedunculus* solitarius vel geminus, ex axilla folii lamina destituti (=cataphylli) nascens, 8–15 cm longus, 2–3 mm crassus, in vivo fusco-purpurascens. *Spatha* coriacea, lanceolata, basi amplectens, apice acuta vel caudato acuminata, circ. 6–8 cm longa, 1.5 cm lata in vivo purpurascens. *Spadix* sessilis, cylindricus, apicem versus attenuatus, quam spatha sat brevior, 5–7 cm longus, ad 0.5 cm in diam., in vivo purpureus. *Tepala* 2 mm longa, subæqualia. *Stamina* 6, tepalis fere æquilonga, linearia. *Ovarium* tepalo æquilongum, urceolatum, apice truncatum, dilatatum, stimagte orbiculare sessili in centro instructo. *Baccae* immaturæ tantum visæ, ovatæ vel ovato-oblongæ, 1 cm longæ, 0.5 cm crassæ. *Semen* solitarium .

BRITISH NORTH BORNEO: Kinabalu Mts. at Tenompok, alt. circ. 5,000 ft. (leg. Furtado, comm. Clemens sub. n. 29.155. Type in Singapore); *ibid.* (Clemens, n. 28,514).

7. **Pothos** (§ Allopothos, ser Longevaginati) **Ridleyanus** Furtado, nom. nov.

*P. ellipticus* Ridley sp. nov. in Journ, Roy. As. Soc. Str. Br. XLI (1903) 48, Mat. Flor. Mal. Pen III (1907) 50 et Flor, Mal. Pen. V (1925) 129. [non *P. ellipticus* Moon ex Miq. Flor. Ind. Bot. III (1859?) 182 et in Berl. Bot. Zeitg. (1856) 562, from Ceylon].

MALAY PENINSULA: *Pahang:* Kuala Tembeling on the Pahang river (Ridley, in Aug. 1891. Syntype); Pulau Tawar (Ridley in Aug. 1891. Syntype); Kota Glanggi (Henderson, 22,411). *Lower Siam,* Bukit (Keah, 24,267).

8. **Pothos Rumphii** Schott Melet I (1832) 21; Engl. Pflanzenr. IV. 23B (1905) 38 f. 16; Merr. Enum. Philipp Pl. I (1922) 173 pro parte.

*Pothos ovatifolius* Engl. in Pflanzenr. IV 23B (1905) 40; Merr, Enum. Philipp Pl. I (1922) 173, *syn nov.*

I do not find any difference between these two except the form of the leaves, and these too show such a great amount of variation as to render the separation of the species on the leaf-shape impossible. In many aroids the adult leaves growing nearer the ground are shorter and more ovate and cordate than the ones more remote. I suspect therefore that *P. ovatifolius* Engl. represents the forms of *P. Rumphii* Schott growing nearer the ground.

The following extends the distribution range of the species:

BORNEO: Ben Kaian (Brooks in Sept. 1908).

MALAY PENINSULA: Pulau Tiuman, an island off the coast of the Pahang State, on rocks (Nur, 21,753).

The Bornean specimen has ovate leaves and the Peninsular has elongate ovate.

I have not seen the specimens of *P. ovatifolius* Engl. var *simalurensis* v. Ald v. Ros. from the Simalur Island off Sumatra. The author describes it as intermediate between *P. Rumphii* and *P. ovatifolius.*

9. **Raphidophora calophyllum** Schott in Bonpl. v. (1857) 45 *nomen,* et Prodr. (1860) 380; Engl. in DC. Monogr. Phan. II (1879) 242 *status nov.*

*R. lancifolia* Schott in Bonpl. V (1857) 45 *nom. nud.,* Prodr. (1860) 380; Mast. in Gard. Chron . II (1874) 611 fig. 124; Engl. in DC. Monogr. Phan. II (1879) 241; Hook. f. Flor. Brit. Ind. VI (1893) 545; Engl. et. Krause in Engl. Pflanzenr. IV 23 B. (1908) 26. *syn. nov.*

*R. peepla* Schott Prodr. (1860) 380 quoad Icon. Hook. ined; Hook. fil. Flor. Brit. Ind. VI (1893) 545 exclus. Wight Icon. t. 780 et. Roxb. Icon. ined; Engl. et. Krause in Engl. Pflanzenr. IV 23–B (1908) 41 p.p. (non *Pothos peepia* Roxb). *syn. nov.*

*R. Schottii* Hook f. Flor. Brit. Ind. VI (1893) 544 quoad Icon. Hook. f. ined. *syn. nov.*

INDIA: The Khasia mountains and Manipur: (Watt. 5905; Griffith 5958; 5959; and 5960; Hooker and Thomson, 1431; 1023; 10052; Gamble, 9749; Clarke 5641, 16674; 26509).

BURMA: Pegu (Kurz. 2656).

*R. lancifolia* is nothing but immature or vigorous growing shoots of *R. calophyllum* having leaves with cuneate base and long acuminate apex. The leaves of such shoots usually appear membranous on drying. The above cited collections which excepting Hooker and Thomson no. 10052 are in Kew Herbarium show various transitions between this stage and the one described as *R. calophyllum*, and such variations may be noticed even on the same plant (cf. Griffith no. 5958). Watt no. 5905 cited by Hooker f., and Engler and Krause under *R. lancifolia* has leaves resembling in shape those described as *R. calophyllum*, but they are herbaceous as in *R. lancifolia*.

I have not seen specimens cited under *R. peepla* in Engler *Pflanzenreich l.c.* for Siam or Indo-China, except those referred by me to *R. hongkongensis*.

The species is apparently endemic in the mountainous regions of Assam and North Burma.

10. **Raphidophora hongkongensis** Schott in Bonpl. V (1857) 44,. Prodr. 1860) 378, Engl. et. Krause in Engl. Pflanzenr. IV 23.B (1908) 35.

*R. peepla* Schott Prodr. (1860) 380 exclus. specimen silhetense et. Icon. Hook f. ined.; Benth. Flor. Hongkong (1860) 344 p.p.; Engl. et. Krause in Pflanzenr. IV 23.B (1908) 41 quoad specimina indochinensia infra citata. *syn. nov.*

*R. Schottii* Hook. f. Flor. Brit. VI (1893) 544 exclus. Icon. ined.; Engl. et. Krause in Pflanzenr. IV 23.B. (1908) 42. *syn. nov.*

INDIA: Assam (Masters, 127 in Kew Heab.); Khasia (Hooker. & Thomson in Kew Herb.). (Syntypes of *R. Schottii.*).

CHINA: Hongkong (Champion, 525. Sterile. Type of the species in Kew Herb.), (Lamont in 1874 in British Museum, sterile); Canton (MacClure, 9655 in Kew Herb.).

INDO-CHINA: (Pierre in Kew Herb.); Tonkin (Balansa, 2055 in Kew).

FORMOSA: (Price, 449, sterile in Kew)?

*R. hongkongensis* was based on a single leaf-specimen (a young detached leaf without any spathe or spadix) collected in Hongkong by Capt. Champion and submitted to Schott by Hooker fil. Better available material from the type region leaves no doubt that it is identical with the Indian material which was mistakenly referred to *Pothos peepla* Roxb., and later described by Hooker as *R. Schottii*. In their *Clavis* to the *Raphidophora* species, Engler and Krause (op. cit. p. 19) placed *R. Schottii* wrongly among the species having a petiole much longer than half the length of the lamina and this wrong disposition in the *Key* (the specific description is correct) is perhaps the reason why they failed to recognise in it *R. hongkongensis*. I have not seen Seemann's specimen quoted under the species by Schott in *Prodr.* (1860) 378, nor have I seen some of the specimens quoted by Engler & Krause l.c. under *R. peepla* from Siam and Indo-China. Hooker's unpublished drawing referred by Schott to *R. peepla* and by Hooker to *R. Schottii* is *R. calophyllum* Schott forma *R. lancifolia*.

Some specimens distributed from the Philippines under *R. Perkinseae* Engl. and *acuminata* Merr. approach very near this species.

11. **Raphidophora kinabaluensis** Furtado spec. nov.

*R. peepla* Schott *sensu* Ridley in Journ. Linn. Soc. XLII (1914) 171 et. Merrill Enum. Born. Pl. (1921) 89 quoad specimen kinabaluense (=Gibbsianum).

*R. calophyllo* Schott (=*R. peepla* auct.), quacum hæc species ab auctoribus ambobus supra citatis confusa est, valde affinis, sed lamina majore, basi haud rotundata, petiolo basin versus multum dilatato et late vaginato facile distinguenda. Foliorum indole etiam *R. Forbesio* Rendle et *R. montanae* Schott sat similis, sed recedit ab illa foliorum lamina oblong-elliptica vel oblong-lanceolata (haud elliptico obovata), pistillis apice truncatis, stigmate sessile coronatis (haud in stylum longiusculum productis), et ab hac spadice sessile (haud breviter stipitato) vagina petiolari latiore nonnibil infra (haud ad vel ultra) geniculum usque attigente.

*Caudex* carnosus, angulosus, circ. 1 cm. crassus, internodiis 2.5–5 cm longis. Foliorum *petiolus* laminæ æquilongus vel fere, interdum quam lamina longior, 15–30 cm. altus, basin versus valide, interdum abrupte, dilatatus, vagina nonnihil infra geniculum attingente late instructus, parte haud vaginata leviter canaliculata vaginatam interdum superante vel breviore, marginem vaginæ secus mox marcescens et laceratus. *Lamina* coriacea, oblongo-elliptica vel oblongo-lanceolata, subæquilatera maxima

latitudine dimidio vel rarissime super mediam sita, basin versus sat attenuata, immo acuta vel obtusa, apice acuta vel sensim attenuata, acuminata, 18-35 cm longa, 6.5-15 cm lata, plurinervia, nervis primaris quam secundariæ vix validioribus. *Pedunculus* 10–12 cm longus, vaginis petiolorum partim tectus. *Spatha* 8–10 cm longa, in vivo flava. *Spadix* spathæ brevior, 3–6 cm longus, pistillis vertice truncatis, dilatatis, stigmate ovale vel oblongo sessile coronatis.

BRITISH NORTH BORNEO: *Kinabalu Mts:* Tenompok alt. circ. 4,500 ft. (leg. Furtado, comm. Clemens sub. n. 26875. Type in Singapore & London); Kamborangah, alt. circ. 6,000 ft. (leg. Furtado, comm. Clemens sub. n. 26713); Dallas, alt circ. 3,000 ft. (Clemens nos. 26121; 26243; 28142); Gurulau spur, alt. circ. 8,000 ft. (Gibbs, 4010 in Brit. Museum); ibid, alt. 6,000 ft. (Clemens, 51128); Penibukan, alt. circ. 5,000 ft. (Clemens, 31094).

It was abundant in open spaces and along bridle-paths at Tenompok. In such exposed situations ripe and unripe spadices could be easily obtained even from the plants trailing on the ground. It was not seen by me in dense or shady forests.

The leaves are very variable in size, both as regards the petiole as well as the lamina. In some cases the petiole may be nearly half the length of lamina, in other cases it is much longer than the lamina itself. In some cases the sheathed portion of the petiole may be longer than the unsheathed portion, in other cases it is much smaller, but in all cases the petiole is much dilated towards the base.

12. **Raphidophora Maingayi** Hook. fil. Flor. Brit. Ind. VI (1893) 543 Rid. Mat. Flor. Mal. Pen. III (1907) 43 et Flor. Mal. Pen. V (1925) 123; Engl. et Krause in Engl. Pflanzenr. IV 23. B=Hft. 37 (1908) 37.
*R. Burkilliana* Ridl. Flor. Mal. Pen. V (1925) 121. *syn. nov.*

MALAY PENINSULA: *Malacca* [near Malacca town] (Maingay, 1556=2972. Type in Kew); Panchor (Goodenough 1926). *Penang*: Pulau Betong (Curtis, 2885, in Kew). *Singapore*: Bukit Panjang (Ridley in 1905); Chan Chu Kang (Goodenough, on December 20th, 1890); Bukit Timah (Ridley, in 1899). *Selangor*: Gua Batu=Batu Caves (Ridley in December 1896; Nur, 8965=Type of *R. Burkilliana,* in Kew and Singapore).

In Maingay's specimen (the type of *R. Maingayi*) a part of the petiole is cut off and it is therefore not possible to judge its length which, as judged from other specimens cited above, is equal to, or is often longer than, the half the length of the lamina. The other specimens from

Malacca, Penang and Singapore have leaves attenuate at base, while the specimens from Selangor have acute or abruptly acute leaf-bases.

Ridley mentions that *R. Burkilliana* has a shortly stipitate spadix. I had not paid a special attention to this point when making the comparison in the Kew herbarium, but the isotype specimen in Singapore has a sessile spadix, although it is fully developed and has in consequence shed its spathe. In fact were it not for the sessile spadices, all our Selangor specimens could have been easily confused with *R. montana* (Bl.) Schott as interpreted by Engler in his *Exsicc. et Illustr.* nos. 5*a* & 5*b*.

*R. gracilipes* Hook. fil. which, according to Ridley, is allied to *R. Burkilliana* Ridl. is a species belonging to a group having membranous, not coriaceous, leaves, with primary nerves very far apart, much stronger than the secondary ones, and very prominent on both the surfaces.

13. **Raphidophora peepla** (Roxb.) Schott in Bonpl. V (1857) 45; et Prodr. (380) p.p. (haud auctt.) (*ex altera parte=R. hongkongensis* Schott).

*Pothos peepla* Roxb. Flor. Ind. I (1820) 454 et (1832) 433; Wall. Cat. (1828) n. 4441.

*Scindapsus peepla* Schott Melet I (1832) 21; Wight Icon. III (1845) 5 t. 780.

*Raphidophora Hookerii* Schott Prodr. (1860) 361 quoad specimen silhetense; Engl. in DC. Monogr. Phan. II (1879) 243 p.p.; Hook. f. Flor. Brit. Ind. VI (1893) 546 p.p. (Wallich's n. 4441 is misprinted as 4444); Engl. et Krause in Engl. Pflanzenr. IV 23. B. (1908) 32 p.p. *syn. nov.*

India: Silhet (Wall. exsicc. n. 4441 in Brit. Museum; in Herb. *Kew partim.*).

Roxburgh's plant came from Silhet and the drawing made by him as well as its lithographic copy issued by Wight in his *Icones* show leaves having distant primary nerves quite distinguishable from the secondary ones. Though the leaves in the drawing are quite young and small (a probable reason why the leaf-base is represented as unusually cuneate) the description says that they (the leaves) vary from 4 to 12 inches in length. It is not certain whether Wallich had seen Roxburgh's specimen, but Wallich's interpretation of *Pothos peepla* Roxb. as represented in his *Exsicc. 4441* (apparently Wallich is not responsible for the mixture in the Kew herbarium) is certainly more in accordance with Roxburgh's drawing and description than the one given by any other systematist. *R. calophyllum* regarded by Hooker fil. and others as identical with *P. peepla* is a distinct and good species

producing coriaceous, or sometimes herbaceous, leaves having primary nerves almost indisguishable from the secondary ones. The latter has not yet been recorded from Silhet.

*R. peepla* comes very near to *R. Hookerii* in the distant primary nervation and the texture of the leaves, but the latter species has not persistent cataphylls at the base of the peduncles or at the apex of the young shoots as in *R. peepla*, and has leaves which are usually crowded at the apex of branchlets and which are also very much larger having stouter nerves, often a cordate or subcordate base. Unlike *R. peepla* which has a lamina drying yellow or stramineous and petiole often longer than the lamina itself, *R. Hookerii* has a lamina drying dark brown and a petiole usually shorter than, rarely equalling, the length of the lamina. The nearest species to *R. peepla* is *R. gracilipes* Hook. f. from the Malay Peninsula which however is distinguished from the former by its very much shorter geniculum at the top of the petiole and smaller stigmata. Roxburgh's *Icones* do not show any long geniculum as in Wallich's 4441, and a sterile specimen apparently of *R. peepla* collected in Assam by Mann has a small geniculum as in *R. gracilipes*. More material from Assam and Malay Peninsula is necessary in order to study the exact relationship of these two species and to say whether *R. gracilipes* deserves to be united with *R. peepla*.

The Ceylon plants referred by Thwaites (*Enum. Pl. Zeyl.*, 1864 p. 336) to *R. peepla* (*Scindapsus*) are *R. pertusa* Schott. As to the other interpretations of *R. peepla* see *R. calophyllum, R. hongkongensis, R. kinabaluensis* and *R. silvestris*.

14. **Raphidophora Rosenburghii** Furtado nom. nov.

*Epipremnum crassifolium* Engl. in Pflanzenr. IV 23. B=37 (1908) 63 fig. 26.

*Raphidophora crassifolia* v.A.v.R. comb. nov. in Bull. Jard. Bot. Buitenz. I (1920) 382 (non *R. crassifolia* Hk. f. Flor. Brit. Ind. VI, 1893, p. 543).

Capt. van Alderwerelt van Rosenburgh, in whose honour the plant is named, was the first to show the fact that Engler's species was not an *Epipremnum* but a *Raphidophora*, but in making the transfer he overlooked the fact that the trivial name *crassifolia* had already been taken up by Hooker for another species of *Raphidophora* occurring in the Malay Peninsula (here reduced by me as a synonym of *R. silvestris* Engl.). The type of *R. Rosenburghii* is a specimen taken from a plant cultivated in the Botanic Gardens, Buitenzorg, of which a detailed diagnostic figure was given by Engler. It has not been collected since,

so that Capt. van Rosenburgh had not seen any specimen of this species in the Buitenzorg herbarium. Its native country is yet unknown.

15. **Raphidophora silvestris** (Bl.) Engl. in DC. Monogr. Phan. II (1879) 239; Engl et Krause in Engl. Pflanzenr. IV 23. B (1908) 22 fig. 6.

*Calla sylvestris* Bl. Catal. Buitenz. (1823) 62, Flor. (1825) 147.

*R. conocephala* v.A.v.R. in Bull. Jard. Bot. Buitenz. I (1920) 384 *syn. nov.*

*R. crassifolia* Hk. f. Flor. Brit. Ind. VI (1893) 543. (non R. crassifolia v.A.v.R.). *syn. nov.*

*R. nigrescens* Ridl. in Journ. Str. Br. Roy. As. Soc. 44 (1905) 185 *syn. nov.*

*R. peepla* Schott *sensu* Engl. et Krause in Engl. Pflanzenr. IV 23. B (1908) 41 quoad specimen borneense; Merrill Enum. Born. Plant (1921) 89 quoad specimina sarawakensia. *syn. nov.*

*R. Wrayi* Hook. f. Flor. Brit. Ind. VI (1893) 544, *syn. nov.*

This is very near to *R. hongkongensis* from which it differs in having its lamina more falcate and the petiolar geniculum sheathed or channelled as far as the base of the lamina or a little beyond. *R. crassifolia* is merely a vigorous growing form which does not show distinctly its nerves on drying. Between these two extremes there occur many gradations which formed the basis of the other species. The size of the leaves and spathes and the character of the leaf nervations do not offer a safe guide to differentiate these forms even into varieties as the characters depend on the age, position and vigour of the shoots. Sometimes it is possible to find various forms even on the same plant. Drying tends to make the leaves darkish whereas in *R. hongkongensis* they become brown, except the specimens from the young growth, which tend to become also blackish.

In *Engler's Pflanzenreich* the grouping or separation in *Clavis* of the species having undivided or unperforated leaves is not natural and is often apt to lead to confusion, as it is based on the size of the leaves. Had the criterion for separating the species been the texture and the venation of the leaves, a far better and more natural grouping of the species would have been obtained, viz.:—

*A.*—Primary nerves few, far apart, much stouter than the secondary ones, very prominent on both sides. Leaves membranous or herbaceous: eg. *R. peepla, R. gracilipes,* etc.

*B.*—Primary nerves few or almost inconspicuous above, slightly prominent beneath. Leaves coriaceous or semi-coriaceous. eg. *R. Lobbii, R. Elmerii,* etc.

*C.*—Primary nerves many, hardly distinct from the secondary ones, slightly prominent or nearly inconspicuous in both surfaces. Leaves coriaceous or semi-coriaceous. eg. *R. silvestris, R. Maingayi, R. montana, R. calophyllum,* etc.

This species has been collected also on the Kinabalu Mountains, up to an altitude of about 4,500 ft. (*eg.* Clemens comm. sub. nos. 26921, 29227 & 27312) but is not represented in Miss Gibbs's collection. Gibbs no. 4010 referred by various authors to *R. peepla* is *R. kinabaluensis* Furtado.

16. **Schismatoglottis retinervia** Furtado spec. nov.

*Sch. patentinerviae* Engl. affinis ut videtur, sed foliorum petiolo pro rata longiore, lamina minore, nervis primariis paucioribus differt.

*Caudiculus* stoloniferus, ramis foliiferis erectis, brevibus. *Petiolus* circ. 6—10 cm. longus ad mediam partem usque vaginatus. *Lamina* (sicca) atro-fusca, subtus pallidior, petiolo æquilonga vel brevior, elliptico-oblonga vel elongato-ovata, utrinque attenuata vel basi rotundata, maxima latitudine dimidio vel infra mediam sita, 6—9 cm. longa, 2—4 cm. lata, margine frequenter undulata, nervis primariis utrinsecus 11—17 arcuatim patentibus, secundariis quam primariæ paullo gracilioribus, tertiariis tenuissimis, omnibus parallelis, reticulationibus subtus distinctis. *Pedunculus* inflorescentiæ immaturæ tantum visus, circ. 3 cm. longus, vaginis foliorum obtectus, vix visibilis. *Spatha* circ. 3 cm. longa, lamina sine acumine 0.8 cm. longo tubo æquilonga. *Inflorescentia foeminea* tertiam spadicis 1.8 cm. longi partem æquans, a mascula fusiformi, dimidio superiore sterili, interstitio 3—4 mm. longo nudo vel floribus abortivis sparse obsito separata.

British North Borneo: Kinabalu Mts.: at Tenompok, alt. circ. 4,500 ft. (legit Furtado, comm. Clemens sub. no. 29153. Type in Herb. Singapore). By streams in dark jungles. Creeping aroid with white spathe and spadix.

The species is very peculiar not only because of its lateral nerves which are almost at right angles to the midrib of the leaf, but also because of the prominent reticulate venation in the lower surface of the leaves. All the parts become brown or dark brown on drying. Though there were many plants of this, it was not possible to get specimens with mature spadices.

17. **Scindapsus perakensis** Hook. fil. Flor. Brit. Ind. VI (1893) 543.

*S. longistipitatus* Merr. in Philipp. Journ. Sci. XXIX (1926) 353 *syn. nov.*

I have not come across any species of *Scindapsus* having persistent spathes and a stipel between the spathe and the spadix as long as 18—20 cm. as stated by Merrill. From an isotype specimen at Kew it is evident that Merrill's species is identical with *S. perakensis* Hook. f. The spathes, as usual, has fallen off and what Merrill describes as a persistent spathe is an axillant cataphyll (=leaf without lamina), and therefore his stipel is actually the peduncle of the inflorescence.

The species has been recorded also on the Kinabalu Mountains in British North Borneo, in the following places: Dallas, alt. circ. 3,000 ft. (Clemens, 26171 & 27719); Menerintog by the Masilau River, alt. circ. 6,000 ft. (leg. Furtado, comm. Clemens sub. n. 29181).

18. **Scindapsus pictus** Hassk. Cat. Hot. Bogor. (1844) 58.

*S. hederaceus* Schott sensu Merr. Enum. Philipp. Pl. I (1922) 178. *syn. nov.*

PHILIPPINES: Luzon (Catalan, 26436; Elmer, 15230; Ramos, 29233; 30383 & 15019).

It had been customary to regard *S. argyraea* Engl. as a juvenile form of *S. pictus*, but from Merrill's account (*op. cit.*) this view might appear to be erroneous since the type of *S. argyraea* is a Philippine plant and Merrill's account shows that *S. pictus* does not occur in the Philippines at all. But from the duplicates of the specimens quoted by Merrill under *S. hederaceus* and preserved in Kew and British Museum it appears that what Merrill calls *S. hederaceus* is really *S. pictus*, the former species not occurring at all in the Philippines. The *pictus* or *argyraeus* forms occur very frequently on the Kinabalu Mountains (Borneo) also, though adult forms are rather difficult to be obtained as they must grow vertically for some length in the sunshine before they can produce the adult stages with flowers and fruits. In virgin forests therefore these stages are found only on the tops of lofty trees.

## PALMAE MALESICAE

### II. *Nenga Wendlandiana* Scheff. or *Nenga pumila* (Mart.) Wendl?

*By C. X. Furtado, Botanic Gardens, Singapore*

There seems to be some doubt which of these two names should be regarded as a synonym, and as the current usage and the authority of some specialists seem to clash with certain well-established nomenclatorial principles an inquiry into the question was undertaken and the results are reported here.

In 1832 MARTIUS published in the *Historia Naturalis Palmarum* many new species of palms among which were *Areca pumila* (without author's name) and *Areca nenga* Bl. (4, pp. 177, 179). The first was fully described and contained an illustration of the plant from which Martius had worked out the description. Apparently the trivial name *pumila* was taken from Blume's manuscript notes or synoptic diagnosis which were supplied to him and which were also quoted in the synonymy of the species, for Martius had realised that there was some discrepancy between his diagnosis and the one supplied to him by Blume. The other species, *Areca nenga,* was one that Martius did not know and the name and the diagnosis were published as supplied by Blume.

In 1836 BLUME (2) published the second volume of his *Rumphia* where he tried to show that Martius had misinterpreted his manuscript species and that *Areca pumila* as described and illustrated by Martius was identical with the plant Blume had called *A. nenga* and which he (Blume) now fully described and illustrated under the newly created genus *Pinanga* as *P. nenga* (2, p. 78, t. 107). Blume further produced a full description and a plate of the plant to which he had intended to apply the name *A. pumila* and to which, according to him, the name should in future be reserved (2, p. 71, tt. 99 & 102 C).

In 1848 (?) MARTIUS (5) published an *Appendix* to his *Historia* where he rejected the genus *Pinanga* of Blume, reduced *Areca nenga* Bl. *apud* Mart. and *Pinanga nenga* Bl. as synonyms of *Areca pumila* Mart. and made *A. pumila* Bl. (*non* Mart.) a variety of *A. triandra* Roxb. This disposition was generally accepted by subsequent botanists until the year 1871 when SCHEFFER (6, p. 166) produced reasons for accepting with minor restrictions the genera *Areca* and *Pinanga* as defined by Blume and also for keeping *A. pumila* Bl. (*haud* Mart.) as a species distinct from *Areca triandra* Roxb. Scheffer, be it noted, was not a strict subscriber to the priority principles and so he took *A. pumila* Bl. (*haud* Mart.) as a valid name for the palm

especially as *A. pumila* Mart. had another name in *A. nenga* Bl., a species retained by him under the genus *Arcca*. In 1875 WENDLAND and DRUDE (9, p. 182) conjointly published a new genus *Nenga* with *Pinanga nenga* Bl. as the type species, but omitted to make any new combination under it. In 1876 SCHEFFER (7, p. 25) supplied the name *Nenga Wendlandiana* for the species *Pinanga nenga* Bl. under the new genus apparently because the combination *Nenga nenga* was not permissible under the existing rules or usage. It is clear that he did not inquire into the matter whether or not *Nenga pumila* was admissible; in fact he does not quote *A. pumila* Mart. as a synonym of *Nenga Wendlandiana*, though he quotes other names which, according to him, are synonyms. In 1878 WENDLAND (8, p. 251), who strictly respected the priority rule, made a new combination of *A. pumila* Mart. (*haud* Blume) under *Nenga*, quoting *Nenga Wendlandiana* Scheff. as a synonym. In 1885 BECCARI (1, p. 83) opined that Wendland was wrong in making the combination because *A. pumila* Mart. (*nec.* Blume) was invalid being based on a misinterpretation of Blume's *A. pumila;* and in this opinion Beccari has been followed by many botanists. But as historically the Blumean interpretation came later than that of Martius, an inquiry into the exact status of *Areca pumila* in Martius's *Historia* seems to be necessary before accepting or rejecting any names or interpretations of the new species published in it

When Martius was working out palms for the *Historia*, Blume communicated to him descriptions of some new species to be published in it. These descriptions were often too short and vague to be of any use even to such an eminent palm specialist as Martius. When it was possible for Martius to identify Blume's (manuscript) species with the material in his own herbarium in Munich, he drew up the specific descriptions from this material only and, presumably, out of courtesy to Blume and perhaps with the view of helping palm students to identify Blume's manuscript names on the herbarium sheets, quoted Blume's manuscript names together with their insufficient or vague descriptions in the synonymy, adding in the citations Blume's localities and vernacular names which were supplied to him in letters. In such cases as these Martius apparently did not hesitate to reject Blume's trivial names if they described inadequately the species or if he had already provided names. Blume's *Euterpe filamentosa* was, for instance, rejected by Martius for what he described as *Areca nibung* (4, p. 173). In other cases when Martius could not recognise Blume's (manuscript) species in the material he had, he published them at the end of the chapter

under each genus where he also listed all dubious and imperfectly known species. Here the Blumean species contained the names and diagnoses exactly as Blume had supplied them to Martius and were therefore published entirely under Blume's responsibility (*e.g. Areca nenga* Bl. and *A. coronata* Bl.). Hence it is apparent that Martius used discretion in adopting or rejecting a manuscript name obtained from Blume, save when it was impossible to connect Blume's description with any material in his own herbarium, and then courtesy constrained him to publish the species with Blume's indifferent or inadequate diagnoses. And what is still more easily noticeable in the *Historia* is that when Martius considered Blume's manuscript descriptions applicable to herbarium material to which he had access, he made this material the basis of his descriptions and illustrations, though in the synonymy and in particulars relating to the habitat or distribution and vernacular names information supplied by Blume was added perhaps, as pointed above, out of courtesy to Blume and to make his book more useful to the palm students of his time. In modern phraseology one can safely say that the type of the descriptions or the species was the material to which Martius had access and not the one which formed the basis of Blume's descriptions quoted in the synonymy.

In the *Historia* one can therefore distinguish at once between the species published on Martius's entire responsibility, even though bearing names suggested by Blume's notes, and the species published wholly on Blume's responsibility. *Areca pumila* falls into the former category. Here Martius may have adopted the name suggested by Blume's manuscript notes because it appeared to him suitable, but the diagnostic characters and detailed description were drawn entirely from the specimen Martius had seen and for which he supplied a good plate. That he adopted Blume's manuscript name and in deference quoted Blume's brief, vague and slightly variant manuscript diagnosis in the synonymy, and in addition quoted at the end of the description the vernacular name and the locality of Blume's plant, should not cloud the fact that *Areca pumila* was not a preoccupied name and that Martius had supplied full details and figures of the species to which this name, till then not preoccupied, should be applied. In view of this it is clear that Martius's publication and reservation of the name for the species are valid and that the species is at the most *A. pumila* Bl. mss. ex. Mart. exclusiv. synon. *A. pumila* Bl. *in litt.* if not simply *A. pumila* Mart., and that its type is not Blume's specimen which Martius had not seen, but Reinwardt's which he had studied and of which he had supplied full details and a plate. One cannot discard

the species because in adopting Blume's manuscript name Martius had misinterpreted the manuscript species, for the author of a new species is not bound to ascertain the type of an unpublished manuscript name in the case he wishes to adopt it (the mauscript name) for the species he wishes to describe as new. The publisher is free to choose his own type independently of that selected by the author of the manuscript name. Nor can one disregard Martius's species on the ground that is is a *mixtum compositum*, for apart from the citation of one specimen, there is nothing in Martius's description or in Blume's description quoted in the synonymy to suggest that it is such a case, and there is an excellent plate to illustrate Martius's type. If a precedent is allowed to eliminate Martius's species because it does not correspond with the alleged type of the manuscript species quoted in the synonymy, though the species itself is fully described and illustrated, then I fear a tremendous slaughter of well known names will be unavoidable and botanical nomenclature will have to bear an unnecessary burden of thousands of additional names coined to replace the discarded ones. Even well known Linnean names may disappear since Linnæus himself had very often tried to identify his species with the ones already described by other authors and so his synonymy is very often found to be a mixture of various species.

But what reasons has one to say that, at the time of supplying the information to Martius, Blume himself was not confused over his *Areca pumila* and *A. nenga* and to maintain that the interpretation given in *Rumphia* is the one that Blume had originally given when transmitting his communications to Martius? What does Blume mean by informing Martius that his *Areca nenga* has distichous fruits and later identifying it with *A. pumila* Mart.? A palm with such characteristics can never be *A. pumila* Mart. or any other species of *Nenga* hitherto described. In fact *Pinanga nenga* Bl. is *Areca nenga* Bl. *apud* (or *in*) Mart. *pro parte*, since the description of the spadix is that of a genuine Pinanga as the genus is currently interpreted. Further as has already been noted by Martius (5, p. 312) Blume gives a figure in his plate showing a trilocular and triovulate ovary, though no mention of it is made in the text and in the generic description given by Blume only a one-locular and one-ovular ovary is indicated. The material from which this figure was drawn did not apparently belong to Blume's *Pinanga nenga*, unless Blume had with him some abnormal material.

*A. pumila* Mart. being valid it follows that *A. pumila* Bl. in *Rumphia* is invalid since it is not applied to the type of Martius. This means therefore that *Nenga pumila*

(Mart.) Wendl. is a valid combination having a better claim for usage over *Nenga Wendlandiana* Scheff. And that *A. pumila* Bl. in *Rumphia* requires a new name. This was found by me (3, p. 226) in the *Areca latiloba* Ridley, of which *A. pumila* Bl. is but a geographical form or a variety.

A note may here be added to show certain errors which have crept into botanical or horticultural literature concerning these two palms, *Areca pumila* Mart. and *A. pumila* Bl., owing to the disregard by some botanists of the priority rule. In the *Flores des Jardins* II (1859), 145, t. 10, Siebold and De Vriese treat the two binominals as if they represent only one species, *A. pumila* Bl.=*A. latiloba* Ridl., as the synonymy quoted and the plate given clearly indicate. In Bailey's *Standard Cyclopedia of Horticulture*, (1917), the binominal *A. pumila* is quoted under *Nenga Wendlandiana* Scheff.=*N. pumila* Wendl. by two authors (N. Taylor and J. G. Smith) and in two places, but since in both these places the name of Blume is added after the binominal and since in one place the plate (*Bot.* Mag. t. 6025) of *A. pumila* Bl.=*A. latiloba* Ridl. is quoted in the synonymy of the *Nenga* species, it is evident that a mistake has been made in considering the two distinct plants *A. latiloba* Rild. and *N. pumila* Wendl., as only one species. In the *Index Kewensis* only the binominal published by Martius is recognized and Martius's plate is also cited, but Blume is regarded as the author of the species and so the homonym published by Blume in *Rumphia* has not been registered. In the *Index Londinensis* (1929) on the other hand, the illustrations of both *A. pumila* Mart. and of its homonym *A. pumila* Bl. are indexed under the first mentioned name.

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## OBITUARY.

*Walter Fox.*

We regret to record the death, on July 23rd, 1934, at the age of 76, of Walter Fox, who was on the staff of the Gardens Department, Straits Settlements, from the year 1879 until 1910. Mr. Fox came originally to Singapore as Head Gardener, to assist H. J. Murton, who was then Superintendent. In 1889 Mr. Fox published a Guide to the Botanic Gardens, Singapore, which gives an interesting record of that period of the history of the Gardens. In 1903, on the retirement of Charles Curtis from Penang, Mr. Fox took charge of the Waterfall Gardens, and continued there until his retirement, from ill health, in 1910.

After retirement, Mr. Fox regained his health sufficiently to undertake journeys to South America and elsewhere for the purpose of reporting on rubber.

## CORRIGENDA.

*The Ferns of Mount Kinabalu*, Gardens' Bulletin, S. S., Vol. VII, part 3, June 1934.

p. 195, line 9, for "beyond Marei Parei, alt. 5000 ft." read "in the Silau Basin, altitude about 6000 ft."

p. 214, line 35, for *serrulatum* read *serratulum*.

p. 215, line 7, for *serrulatum* read *serratulum*.

p. 324 (index), for *Trichomanes serrulatum* read *serratulum*.

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*Notes on the Biology of Macaranga spp.*, Gardens' Bulletin, S. S., Vol. VIII, part 1, October 1934.

p. 63, line 22, for "specimens" read "species".

p. 63, line 36, for "indurated to accommodate" read, "too indurated to accommodate".

p. 64, line 20, for "*(Plate XV, figs. 2, 3)*" read "(Plate XIV, figs. 5 and 6)".

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